

Using text-messages to promote positive youth mental health and wellbeing

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Abstract

Statistics around poor mental health in New Zealand youth illustrate a strong need for intervention. Indeed, positive mental health has been described as critical to positive youth development, with its promotion equipping youth with necessary resources, supports, and life skills. Health promotion and prevention activities have the potential to support the development of positive youth mental health. The use of technology to deliver health promotion interventions is gaining rapid support, however little is known about its use to deliver health promotion interventions that are grounded in positive psychology theories. This study explored the effectiveness of a gratitude-based text-message intervention on youth mental health and wellbeing, and the feasibility of this approach with youth. Participants were 136 young people recruited from around New Zealand. Upon consent, participants were randomly assigned to either a gratitude condition, or a reflective condition. In the gratitude condition, participants received a daily question sent over text-message asking them about specific things in life that they were thankful for. In the reflective condition, participants were asked daily questions over text-message about their everyday lives. Six variables were measured at pre-, post- and one month follow up intervention intervals. Surprisingly, results showed no significant differences between groups; however, main effects were found for the intervention itself. Immediately post-intervention, significant main effects were found for increases in self-esteem and wellbeing, and decreases in depression. At one-month follow-up, the main intervention effect for wellbeing remained significant. The study illustrated high engagement throughout the intervention in both conditions, suggesting that the approach is a suitable means for reaching youth in an enjoyable, engaging format.

Table of Contents

1	Introduction	1
1.1	Mental Health Status of New Zealand Youth	2
1.2	Response: Health Promotion	7
1.3	Overview of Following Chapters.....	9
2	Exploring novel approaches to promoting positive youth mental health and wellbeing	10
2.1	Gratitude	10
2.1.1	Development of Gratitude.....	14
2.1.2	Outcomes/Associations	15
2.2	Gratitude Interventions	21
2.2.1	Gratitude Interventions	22
2.2.2	Methodologies.....	25
2.2.3	Enhancing the effectiveness of gratitude interventions	34
2.3	E-Health Promotion	35
2.3.1	Internet-based health promotion	41
2.3.2	Mobile-phone-based health promotion approaches	46
2.3.3	Summary of e-Health Promotion	53
2.4	Present Study	54
3	Methodology	58
3.1	Ethical considerations	58
3.2	Recruitment	60
3.3	Participants	63
3.4	Procedure	67
3.4.1	Sign up	67
3.4.2	Pre-intervention questionnaire	68
3.4.3	Condition assignment.....	69
3.4.4	Text-application	69
3.4.5	Text-messages	72
3.4.6	Post- and follow-up questionnaires.....	77
3.5	Measures.....	78
3.5.1	Gratitude	79
3.5.2	Life Satisfaction	80
3.5.3	WHO-5 Wellbeing Index	80
3.5.4	Self-Esteem	81
3.5.5	Depression.....	82

3.5.6	Anxiety.....	83
3.5.7	Mindfulness.....	84
3.6	Analytic Strategy	85
4	Results	87
4.1	Impact of receiving daily text-messages on youth mental health and wellbeing variables	87
4.1.1	Pre-Intervention	87
4.1.2	Condition comparisons at post-intervention and follow-up.....	89
4.1.3	Growth-curve and moderation analyses.....	94
4.2	Delivery of intervention	98
4.2.1	Engagement.....	98
4.2.2	Text-message responses	101
4.2.3	Intervention delivery issues	104
4.2.4	Action on risk management plan	105
4.3	Subjective evaluations	109
5	Discussion	113
5.1	Aim one: Effectiveness of a text-message-based gratitude intervention on youth mental health and wellbeing	113
5.1.1	Study design: explaining post- and follow-up findings	115
5.1.2	Moderators	121
5.1.3	Methodological considerations	122
5.2	Aim 2: feasibility of this approach with youth aged 16-21 years	123
5.2.1	Engagement and interaction.....	124
5.2.2	Considerations for health promotion	127
5.3	Future research and development	134
6	Conclusion	137
7	References	139
8	Appendixes	164

List of Figures

Figure 1. The Determinants of health (Dahlgreen & Whitehead, 1991)	8
Figure 2. Adaptive cycle of gratitude and happiness (Watkins, 2004, p. 185).....	17
Figure 3. Screenshot of the MindfulTXT study website’s homepage.	61
Figure 4. Example of the MindfulTXT study website being shared by Youthline on Facebook.	62
Figure 5. Screenshot of phone showing a sign up and first daily question (received after completing pre-questionnaire).....	68
Figure 6. Screenshot of text-application homepage, showing one unanswered incoming text-message.	70
Figure 7. Screenshot of text-application with open client file, showing a text-message being replied to.	71
Figure 8. Phone screenshot showing example questions, a participant reply, and a common reply (gratitude condition).....	77
Figure 9. Main effects for the intervention over time on gratitude in the gratitude and the reflective conditions.	92
Figure 10. Main effects for the intervention over time on wellbeing in the gratitude and the reflective conditions.	93
Figure 11. Main effects for the intervention over time on depression in the gratitude and the reflective conditions.	93
Figure 12. Effect of the intervention across time on wellbeing among those with low levels of depression at pre-intervention.	97
Figure 13. Effect of the intervention across time on wellbeing among those with high levels of depression at pre-intervention	98

List of Tables

Table 1. How participants heard about the study	63
Table 2. Demographic background of participants	65
Table 3. Text-message questions that were sent to participants in the Gratitude and Reflective Conditions	73
Table 4. Common replies sent to participants.....	76
Table 5. Mean differences (MANOVA) across groups at pre-test	88
Table 6. Analyses of Covariance for Post- and Follow-Up Intervention Measures: Adjusted Means and Standard Errors	90
Table 7. Repeated Measures ANOVAs for the Main Effect of Intervention (combined across both groups) from Pre- to Post-Intervention and the Interaction between Intervention and Gratitude versus Reflective groups.....	91
Table 8. Estimates of fixed effects. Growth-curve analysis for wellbeing with depression as the moderating variable	96
Table 9. Level of engagement in each condition	99
Table 10. Example questions and participant replies in the gratitude condition	101
Table 11. Example questions and participant replies in the reflective condition	103

1 Introduction

The World Health Organisation (1946) defines health as ‘... a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity’, illustrating that, amongst other elements, mental health is fundamental to health and wellbeing. Positive mental health has been described as critical to positive youth development, with its promotion equipping youth with necessary resources, supports, and life skills (Barry, 2009; Organisation, 2013; Patel, Flisher, Hetrick, & McGorry, 2007). As Clark et al. (2013) show, “Adolescent wellbeing is of critical importance, both for navigating the challenges of the teenage years, and for establishing healthy patterns for adult life” (p.7). Despite the many benefits of positive mental health, statistics around poor mental health illustrate the need for intervention. In 2010, it was estimated that 7.4% of the global burden of disease was attributable to mental and behavioural disorders (a 38% increase since 1990) (Murray et al., 2012), and in New Zealand, mental disorders represent the third leading cause (11.1%) of health loss (depression and anxiety disorders = 5.3%; alcohol use disorders = 2.1%; and schizophrenia = 1.3%) (Ministry of Health, 2013a). Adolescence and early adulthood is considered a peak period for the onset of mental illnesses, with 75% of all adult diagnoses of mental ill-health having onsets before the age of 25 years (Kessler et al., 2005). Thus, promoting positive mental health and wellbeing through adolescence is important, and health promotion and prevention activities have the potential to do this. This thesis addresses youth mental health in New Zealand through the design, implementation, and evaluation of a novel gratitude intervention delivered through text-messages – a popular communication medium with youth. The rest of this chapter provides a background to youth mental health in New Zealand, relevant health promotion principles, and ends with an outline of how this thesis will be developed.

1.1 Mental Health Status of New Zealand Youth

Mental health problems are a major issue affecting New Zealand's youth. In the 2004 New Zealand Mental Health Survey, youth (16-24 years) reported the highest rate of mental health disorders (28.6%) of any age group (Oakley Browne, Wells, Scott, & (eds). 2006). The most common mental health disorders included anxiety (17.7%) and mood disorders (12.7%). While recent evidence from the 2012 National Secondary School Youth Health Survey (Youth '12) found that the majority of students (Years 9 to 13) reported good emotional wellbeing (82% of males, 71% of females) (Clark et al., 2013), a large minority reported serious mental health issues.

A first key area of concern is *depression*, characterised by a persistent low mood that has a major impact on everyday activities (Merry & Stasiak, 2011). In the Youth '12 survey, a significant proportion of secondary school students reported that, for at least two consecutive weeks in the previous 12 months, they had felt down or depressed for most of the day (38% of females and 23% of male students). There were no significant differences in depressive symptoms between Māori and New Zealand European/Pākehā students; however, females (16%) were more likely to report symptoms that were clinically significant than males were (9%) (Clark et al., 2013).

Another key mental health problem affecting youth is *self-harm*. The Youth '12 survey found that, in the previous 12 months, 29% of female students and 18% of male students had deliberately harmed themselves (Clark et al., 2013). Further, in 2011, rates of intentional self-harm hospitalisations in New Zealand were highest among youth (15-19 years) and, within this age group, were more than twice as high among females (212.0 per 100,000) than males (80.8 per 100,000) (Ministry of Health, 2014). Despite no statistically significant differences in the rates of self-harm between Māori and non-Māori youth in either of these data sets, the

decreasing rates of youth self-harm hospitalisations between 1996 and 2011 were more pronounced among non-Māori (39.4%) than Māori (13.5%) (Ministry of Health, 2014). Age-standardised rates of intentional self-harm hospitalisations also increased with increasing deprivation (Ministry of Health, 2014).

A third key area of concern is *suicide*. Alarmingly, New Zealand has the second highest youth suicide rate (15-24 years) in the OECD (Ministry of Health, 2014). In 2011, almost a quarter ($n = 118$) of the 497 (23.74%) suicides were among people aged under 25 years (Ministry of Health, 2014). In contrast to rates of self-harm, youth suicide was significantly more common among males than females (ratio: 2.8 to 1) (Ministry of Health, 2014). Suicidal thoughts and attempts were more common in females than males however; in the previous 12 months, 21% of female students and 10% of male students had thought seriously about suicide, and 6% of female students and 2% male students had made a suicide attempt (Clark et al., 2013). Such figures, in addition to the higher rates of intentional self-harm among females than males, support the possibility that females may make more non-fatal suicide attempts. In addition to gender inequalities, significant ethnic inequalities in youth suicide rates exist, with suicide rates among Māori youth (15-19 years) (36.4 deaths per 100,000) being more than twice that of non-Māori youth (15.1 deaths per 100,000) (Ministry of Health, 2014). Further, declining suicide rates in recent decades have only occurred among non-Māori (Skegg, 2011).

Risk Factors and Inequalities

Addressing identified youth mental health issues is important to help reduce their impact on individuals, family/whānau, and society; however, doing so is challenged by numerous risk factors for poor mental health. Risk factors for poor mental health include family and social factors (e.g. witnessing violent behaviour in the home), family history of

psychiatric disorders, and previous suicidal behaviours (Denny, Fleming, Clark, & Wall, 2004; Merry & Stasiak, 2011; Skegg, 2011). Ethnicity and socioeconomic status are also risk factors for poor mental health, and reflect broad inequalities. Although there were no ethnic differences in the prevalence of depression and self-harm among youth, the 2004 Mental Health Survey found that Māori youth (16-24 years) were more likely to suffer from two or more mental health disorders than were non-Māori (Oakley Browne et al., 2006).

Evidence suggests that although inequalities are not prominent among youth populations, they are likely to widen in adulthood. For example, among adults, research has found higher psychological distress in Māori compared to non-Māori, and, after adjusting for age, ethnicity, and sex, adults in the most deprived areas of New Zealand were 1.6 times more likely to have ever been diagnosed with common mental disorders than those in the least deprived areas (Ministry of Health, 2013b). Universal risk factors for poor health (e.g. unemployment, low educational achievement, and poor housing) are also disproportionately high in Māori adults, who may also experience Māori-specific risk factors (e.g. societal prejudice, dispossession, and alienation from cultural resources) (Durie, 2004, as cited in Ball (2010)). Further, a study on self-reported experiences of racial discrimination in health services found that Māori experienced racial discrimination disproportionately in comparison to other ethnic groups, experiences of which could contribute significantly to ethnic health inequalities (Harris et al., 2006). This broad range of risk factors illustrates the need for intervening early and at multiple levels.

Impacts of poor mental health

Mental health problems can easily go unrecognised, especially depression, as young people and family members may believe that symptoms are instead a part of the usual adolescence experience (Merry & Stasiak, 2011). Early diagnosis and treatment of mental

health problems is important due to their recurrent nature and poor long-term associations. In a New Zealand longitudinal study, Fergusson, Boden, and Horwood (2007) found that 22.7% of cohort members ($n = 982$) reported two or more episodes of major depression between the ages of 16 and 21, and 3.9% reported ten or more episodes. Such recurrence has been described as a 'kindling effect', whereby each depressive episode increases the probability of another one (Merry & Stasiak, 2011). Another analysis from the same data set showed that young people (14-16 years) with depression had an increased risk of adverse psychosocial outcomes in later adolescence and early adulthood (16-21 years), including educational underachievement, early parenthood, and unemployment, in addition to an increased risk of anxiety and major depression (Fergusson & Woodward, 2002). Youth mental health problems have also been associated with higher health care system utilisation, poorer self-rated general health and poorer mental health, in addition to adverse economic outcomes at 25 years (Fergusson et al., 2007; Jonsson et al., 2011; Keenan-Miller, Hammen, & Brennan, 2007).

In addition to the short- and long-term impacts resulting from poor mental health on both individuals and their families/whānau, the burden of poor mental health has significant economic consequences to society. Lost economic output attributable to mental disorders has been estimated to have a global economic burden of over US\$16.0 trillion between 2011 and 2030 (Bloom et al., 2011). Specific to New Zealand, Merry and Stasiak (2011) identify the indirect costs of poor adolescent mental health as teenage pregnancies, substance abuse, and poorer long-term health. The true cost of youth mental health is likely to be hidden in other services too (e.g. education and justice) (Mental Health Commission, 2011). Longer-term, poor mental health is likely to affect one's ability to work, as adults with mental health issues have also reported poorer health status, work performance limitations and taking more time off work (Ministry of Health, 2010).

Minimising mental health problems

Seeking help early and accessing treatment can minimise the negative impacts of mental illness (Ministry of Health, 2010). However, mental healthcare delivery is limited worldwide and challenged by a wide range of factors (e.g. socio-cultural stigmas, underfunding, workforce shortages, and a focus on institutional rather than community based care) (Farrington, Aristidou, & Ruggeri, 2014). Specialist services are also expensive to access privately (Merry & Stasiak, 2011), limiting reach to certain populations and thus have the potential to widen inequalities. Even if services are within reach, evidence shows that young people with depressive symptoms are unlikely to seek professional help (Mariu, Merry, Robinson, & Watson, 2012; Young, Miller, & Khan, 2013). Using data from the Youth2000 Health and Wellbeing Survey (a predecessor to the Youth '12 survey, using a randomly selected sample of 9,699 secondary school students from across New Zealand), Mariu et al. (2012) found that 82% of students who had significant mental health problems had not sought professional help. A range of variables may influence help-seeking behaviour, including severity of mental illness, socio-economic factors, personality, emotional competence, family and community connectedness, and gender (Ciarrochi, Wilson, Deane, & Rickwood, 2003; Mariu et al., 2012; Rickwood & Braithwaite, 1994). Strong and consistent associations with poor help-seeking have also been found between high self-stigma, poor mental health literacy, low emotional competence, and shyness (Bradford & Rickwood, 2014). Of further concern is that young men, who have poorer mental health knowledge and higher mental health stigma than young females (Chandra & Minkovitz, 2006; Cotton, 2006), may find it particularly difficult to seek help due to such behaviour being seen at odds with culturally dominant masculine traits (e.g. independence, suppressing emotion) (Ellis et al., 2013).

Whilst it is thus important to research ways of encouraging youth to seek professional help (Mariu et al., 2012), so too is researching alternative approaches to delivering mental

health interventions to youth. Doing so may work to mitigate the described implications of adolescent mental illness, help to minimise its cumulative nature, and minimise the high social and economic costs that are associated with adolescent mental health problems (Bailey et al., 2013). Population-wide mental health promotion initiatives aimed at youth may be particularly important, especially those that have the potential to help individuals, with or without mental health problems, to flourish in their lives.

1.2 Response: Health Promotion

Health promotion is defined as ‘... the process of enabling people to increase control over, and to improve, their health’ (World Health Organisation, 1986). Acknowledging the many determinants of health, health promotion uses broad, inter-sectoral approaches, including policy development, empowerment, equity, and community participation and accountability. Such strategies have been derived from a number of global initiatives, including the Lalonde report (1974), Alma Ata declaration (World Health Organisation, 1978), and the Ottawa Charter (World Health Organisation, 1986). Alongside key Ministry of Health documents, the Ottawa Charter in particular is a key document guiding Health Promotion in New Zealand. Developed at the First International Conference on Health Promotion in 1986, the Ottawa Charter shifted health promotion from an individualistic health education approach towards a broader framework that recognizes both an individual and a collective responsibility for health (Green & Tones, 2010; Naidoo & Wills, 2009). The Ottawa Charter has five main action areas, including to; ‘Build healthy public policy’, ‘Create supportive environments’, ‘Strengthen community action’, ‘Develop personal skills’, and ‘Re-orient health services’. Guiding health promotion documents confirm that a healthy population requires a physical, social, and economic environment that supports their health and wellbeing (Ball, 2010). Such needs are illustrated in Figure 1, which depicts the Dahlgren and Whitehead (1991) conceptualisation of the social ecological determinants of health that occur

at different levels. The model illustrates the different layers that influence health. These include biological factors, individual behaviour and lifestyles, social and community networks, living and working conditions, and access to services. The model also shows general socioeconomic, cultural, and environmental conditions (e.g. standards of living).

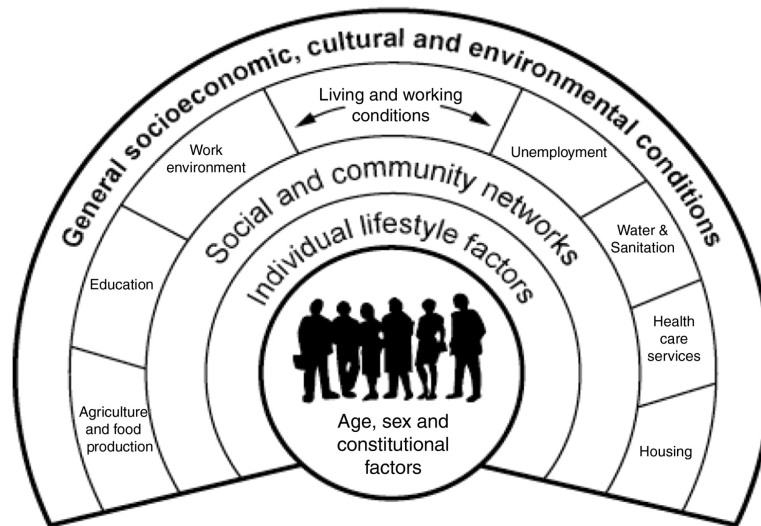


Figure 1. The Determinants of health (Dahlgren & Whitehead, 1991)

There is some ambiguity in the literature on *mental health promotion*, and definitions differ depending on professional background, values, and cultures (Ball, 2010). Despite a common misconception that mental health promotion is aimed at people experiencing mental illness and/or increasing awareness of mental health issues (Ball, 2010), the vast majority of definitions focus on enhancing people's capacity to maintain positive mental health and wellbeing, and are universal in their scope (Ball, 2010; Rickwood, 2012). By contrast, prevention activities aim to reduce the incidence and seriousness of specific mental health problems, but have many benefits when partnered with health promotion initiatives (Clarke, Kuosmanen, & Barry, 2015).

In New Zealand, youth mental health promotion is positioned at the intersection of public health, youth health, mental health, and Māori health (Ball, 2010). In light of the

factors influencing mental health, Ball (2010) indicates that youth mental health promotion programmes should have the following objectives: to ‘enhance the positive, reduce the negative’; ‘address both individual and environmental factors’; and to ‘use both universal and targeted interventions’ (pp. 17-18). Successful interventions are characterised by holistic approaches that address both individual and environmental level factors, are culturally appropriate and tailored to age level and gender, use comprehensive approaches, are long-term, are informed by theory and research, include youth participation and leadership, and use a skilled and competent workforce (Ball, 2010). Prevention programs should also be integrated into settings where they are able to benefit youth (Redzic et al., 2014). In contrast, delivering information alone, focusing on individual behaviour change (without addressing environmental factors and/or generic skills), fear inducing interventions, and unstructured youth activities do not work well in youth mental health promotion (Ball, 2010). There is a clear need for approaches that are relevant for youth and engaging, which is what the current study aims to achieve.

1.3 Overview of Following Chapters

This chapter illustrates the need to address youth mental health, and to find engaging and interactive ways to do this with youth. Chapter two provides a literature review on two emerging areas used in health promotion that have the potential to reach and engage young people, including positive psychology (gratitude), and technology-based health promotion. Chapter three describes the study’s methodology, including how participants were recruited, their characteristics, the delivery of the intervention, and youth mental health and wellbeing outcome measures assessed. Chapter four presents the findings of the study, and chapter five discusses these findings, their implications, and ideas for future development.

2 Exploring novel approaches to promoting positive youth mental health and wellbeing

The introduction has illustrated a strong need to address youth mental health at an early stage. Only in recent years has mental health promotion shifted from focusing on minimising specific mental problems, and instead focus on the promotion of positive mental health and wellbeing. This chapter reviews literature that has helped to inform the development and implementation of the current study. Literature was compiled by searching databases (The Cochrane Library, PsycINFO, PubMed, Web of Science), and used a range of search terms (including ‘gratitude’, ‘gratitude interventions’, ‘e-health promotion’, ‘technology AND health promotion’, ‘Text-message/SMS AND health promotion’, ‘Internet AND health promotion’, ‘smartphone/applications AND health promotion’). This literature review starts with an overview of gratitude conceptualisations, its development, and range of associations. The second section reviews the varying approaches to delivering gratitude interventions, their methodologies, and how their effectiveness could be enhanced. The third section looks at technology-based health promotion interventions and the relative strengths and limitations of key delivery approaches. In these latter two domains, there is considerable heterogeneity in both the content and delivery of interventions, meaning it is difficult to draw conclusions. The literature review ends with a rationale for the current study.

2.1 Gratitude

“... we all know what it is until we attempt to define it” (Watkins, 2014, p. 13)

Gratitude has a long history of ideas among philosophers, theologians, and writers who, as Emmons and McCullough (2004) describe, have portrayed gratitude as “an indispensable manifestation of virtue – an excellence of character” (p.3). It is only in recent decades

however that psychology has offered more insight into gratitude's nature. This focus is likely motivated by the positive psychology movement that has directed attention towards recognising and nurturing human strengths and virtues to help individuals and communities thrive and flourish (Seligman & Csikszentmihalyi, 2000). There is widespread uncertainty regarding gratitude's nature, but it can be broadly conceptualised as a key link between giving, receiving and repaying. A consensus in the psychology literature is that gratitude arises when an individual (beneficiary) recognises and appreciates that another person (benefactor) has intentionally acted to give them an altruistic gift that the beneficiary does not necessarily feel they have earned or deserved (Emmons & McCullough, 2004; Watkins, 2014).

Benefits in the gratitude experience are not time limited, and could be something that has just taken place, something that has happened in the past, or a benefit that has been consistent over time (Watkins, 2014). Most conceptualisations also support the idea that gratitude can be attributed to non-human sources, such as a god, animals, nature or even the removal of unpleasant events (e.g. surviving a natural disaster) (Buck, 2004; Emmons & McCullough, 2003, 2004; Watkins, 2014; Wood, Froh, & Geraghty, 2010). In such instances, the source of the benefit is personalised in some way. As Watkins (2014) exemplifies, a pet may not intentionally provide benefits to its owner, but the owner will still experience gratitude if they perceive that their life has benefitted from the pet's presence. The following discussion defines gratitude through the three levels of Rosenberg's (1998) typology (emotional state, affective trait, and mood state), which Watkins (2014) identifies as important to understanding the phenomenon of gratitude.

Lazarus and Lazarus (1994) argue that gratitude should be seen as an *empathic emotion* as it involves thoughtfulness about the benefits that one receives from others, and is one level of Rosenberg's (1998) typology. Supporting this is evidence to suggest that the duration of grateful emotions are longer when events are judged with higher importance (Verduyn,

Delvaux, Van Coillie, Tuerlinckx, & Mechelen, 2009). Further, McCullough, Kilpatrick, Emmons, and Larson's (2001) gratitude theory proposes that gratitude functions as a moral emotion in three different forms. As a moral *barometer*, beneficiaries respond with gratitude to a benefactor's generosity, recognising that the benefactor has purposely done something to benefit their wellbeing. As a moral *motive*, gratitude motivates beneficiaries to act pro-socially. Finally, as a moral *reinforcer*, the theory proposes that when beneficiaries express gratitude to their benefactors, benefactors are more likely to engage in future pro-social behaviour themselves (this is explored further in section 2.1.2). The theory also positively correlates gratitude with moral traits (e.g. agreeableness, empathy, and perspective taking), and negatively with characteristics that may deter positive relationships and moral behaviour.

Compared to a grateful emotion (i.e. the feeling of gratitude), *trait gratitude* relates to the *being* of gratitude (e.g. a grateful person) and is a second level of Rosenberg's (1998) typology. As a trait, McCullough, Emmons, and Tsang (2002) propose that gratitude can be conceptualised at several levels of analysis, ranging from momentary affect to long-term disposition. They identify four qualities that distinguish highly grateful people from less grateful people, including that grateful people experience gratitude more *intensely* for a positive event, and more *frequently* throughout the day. Grateful people also experience gratitude across a wider *span* of experiences (families, health, life itself), and with greater *density* (as they tend to be grateful to a wider range of people for any one outcome, such as obtaining a good job). Watkins (2014) proposes three pillars that make a person more likely to have the above facets, including a strong sense of abundance, appreciation of simple pleasures, and appreciation of others.

Moods are referred to interchangeably with emotions, and indeed both are transient states in comparison to affective traits (Watkins, 2014). However, *grateful moods*, a third level of Rosenberg's typology, tend to be more in the background of our awareness and more

enduring than grateful emotions (Watkins, 2014). Further, compared to grateful emotions, grateful moods are likely to have greater influence on people's adaptive functioning.

McCullough, Tsang, and Emmons (2004) investigated grateful moods through a three week daily monitoring period. Disseminating their findings, Watkins (2014) argues that grateful moods in people with high trait gratitude were largely determined by their disposition to be grateful and being grateful for benefits that are consistent and not limited by time (i.e. a top down effect), while the grateful moods of less grateful individuals were driven by daily events and specific benefits (i.e. a bottom up effect). Thus people high in trait gratitude have less room to improve their moods than those lower in gratitude, which may also hide relationships between mood and events (Watkins, 2014).

While the above conceptualisations illustrate the positive way in which gratitude is often experienced, it is possible that gratitude may be expressed as a means of gaining greater benefits, such as commercial relationships where the line between a gift and a bribe may be difficult to draw (Buck, 2004). Buck's (2004) conceptualisation of gratitude also illustrates how the type of gratitude exchange may result in negative feelings. In contrast to the *gratitude of caring* (where both the benefactor and the beneficiary benefit through a reciprocal relationship), the *gratitude of exchange* is where the beneficiary receives something that is valued from a benefactor, who is thus considered more 'powerful' relative to the receiver. This exchange can result in issues surrounding obligation, equity, and reciprocity as a result of power imbalances (Buck, 2004). However, while the obligation that is felt to repay one's benefactor may result in feelings of indebtedness, the two concepts have distinct thought/action tendencies (e.g. gratitude's association with pro-social tendencies) (Watkins, 2014). Further, in contrast to an economic debt, a moral philosopher, Roberts (as cited in Watkins, 2014; p.37) defines gratitude as "...a glad acceptance of our debt to one who has acted for our benefit". Such arguments suggest that these 'negative' feelings that may be a

part of the gratitude experience may in fact have positive implications where they encourage people to act pro-socially.

2.1.1 Development of Gratitude

Extensive debate surrounds the point in the developmental period at which humans first feel gratitude. Although young children may appear to be able to express gratitude (e.g. by thanking a friend for a gift), this behaviour may simply be a result of socialisation. Indeed, even adults may express gratitude without actually feeling it (Buck, 2004). The early attachment period, during which time a bond is developed between infants and their caregivers (Bowlby, 1969), could contain elements of primitive gratitude. This theory lacks empirical support however, and misses a key pre-requisite for the experience of interpersonal gratitude, the understanding of self (McAdams & Bauer, 2004). Growing psychological research suggests that gratitude is developed through middle childhood (7-10 years), when children are able to make the social-cognitive judgements of intentionality and cost to benefactors that gratitude assumes (Emmons & Shelton, 2002; Graham, 1988). Similarly, the ability to empathise has also been proposed as a pre-requisite for the experience of gratitude (Lazarus & Lazarus, 1994; Park & Peterson, 2006). Indeed, Park and Peterson (2006) argue that gratitude requires children's perspective taking abilities to be developed enough for them to understand and appreciate others' intentions to improve their life satisfaction. Such ability is thought to be in place by age 10 (Park & Peterson, 2006), and is likely to strengthen as adolescents become less egocentric (Saarni, 1999). Further support for these arguments comes from research that shows older children (9-12 years) may attribute gratitude to a wider range of themes than younger children (4-8 years) do. However this research acknowledges this could also be a result of greater verbal fluency (Gordon, Musher-Eizenman, Holub, & Dalrymple, 2004). More research is needed to determine when youth start to experience

gratitude in similar ways to adults, and whether its capacity evolves throughout the lifespan (Layous & Lyubomirsky, 2014).

In a review of wellbeing literature, Lyubomirsky, Sheldon, and Schkade (2005) argued that individual differences in the levels of some positive emotions are largely determined by one's genetic set point, and are thus assumed to be relatively stable and immune to influence or control. Of the few studies that have investigated whether gratitude has a familial link, Steger, Hicks, Kashdan, Krueger, and Bouchard (2007) examined the genetic links between character strengths in 336 adult twins (51 monozygotic (identical) pairs and 40 dizygotic (fraternal) pairs). Results showed a moderate correlation between the gratitude levels of identical twins ($r = 0.39$) and a small correlation between fraternal twins ($r = 0.18$). Forty percent of the variability in trait gratitude was estimated to be due to genetic influence. In another study, Hoy, Suldo, and Mendez (2013) explored the link between parents' ($n = 246$) and children's ($n = 148$, mean age = 10.22 years) levels of gratitude, life satisfaction, and hope. Specific to gratitude, results found a significant correlation of self-reported gratitude levels between mother and child ($r = 0.23$), but not between father and child ($r = 0.07$, *ns*). More research is needed to determine whether this difference is due to a genetic link, and could be explained by children spending more time with their mothers and thus pick up on their gratitude more than that of their fathers (Hoy et al., 2013). As will be discussed, findings in existing literature on gender differences in the experience and expression of gratitude further supports a social learning explanation of the correlation between mother and child gratitude.

2.1.2 Outcomes/Associations

The regular experience of positive emotions themselves have been associated with a wide array of positive outcomes, including increased resilience, social-integration, wellbeing,

creativity, vitality, optimism, and improved immune functioning, in addition to lower levels of stress and depression (Emmons & McCullough, 2004; Fredrickson, 2001; Fredrickson & Joiner, 2002; Froh & Bono, 2011; McCullough et al., 2002). Beyond societal expectations to practise “thank you”, there is growing support for gratitude’s association with several positive outcomes, including those psychological, pro-social, and physical (e.g. increased exercise, improved sleep quality) (Emmons & McCullough, 2003; Froh, Sefick, & Emmons, 2008; Jackowska, Brown, Ronaldson, & Steptoe, 2015; Rash, Matsuba, & Prkachin, 2011). The following outlines some of gratitude’s key associations.

Positive affect/Happiness

Gratitude is argued to be one of the most potent elicitors of pleasant affect (Emmons & McCullough, 2003), and grateful people experience more frequent contentment, happiness, and hope, as well as fewer negative emotions (McCullough et al., 2002; Watkins, Woodward, Stone, & Kolts, 2003). Correlational studies have contributed to the ambiguity over whether gratitude causes happiness, or happiness causes gratitude. As Figure 2 depicts, Watkins’ (2004) proposal suggests that gratitude and happiness feed off each other in an adaptive cycle, where gratitude promotes happiness, and happiness promotes more gratitude. This adaptive cycle is supported by indirect evidence showing that inducing positive affect can enhance the experience of gratitude, as people may feel more grateful for what they have if they are feeling good (Isen, Shaker, Clark, & Karp, 1978). Further, if people are positive, they are more likely to recognise the goodness of their benefactors (Isen, Niedenthal, & Cantor, 1992).

Wellbeing

Gratitude scales have been found to have strong correlations with the Satisfaction with Life Scale (SWLS), a key measure used to assess wellbeing. These include both the GQ-6 measure ($r = .53$) (McCullough et al., 2002), and the GRAT measure ($r = .49, r = .50$)

(Watkins, Grimm & Hailu, 1999; Watkins, Porter, & Miller, 1997, as cited in Watkins, 2004). Evidence that gratitude is related to wellbeing in youth has only recently emerged, and is represented in a range of outcome measures. Among early adolescents, gratitude was found to be negatively related to physical symptoms and positively related to positive affect, perceptions of peer and familial social support, optimism, providing emotional support, and satisfaction with school, family, community, friends, and self (Froh, Kashdan, Ozimkowski, & Miller, 2009). Among late adolescents, gratitude was positively related to life satisfaction, social integration, absorption, and academic achievement and negatively related to envy, depression, and materialism (Froh, Emmons, Card, Bono, & Wilson, 2011).

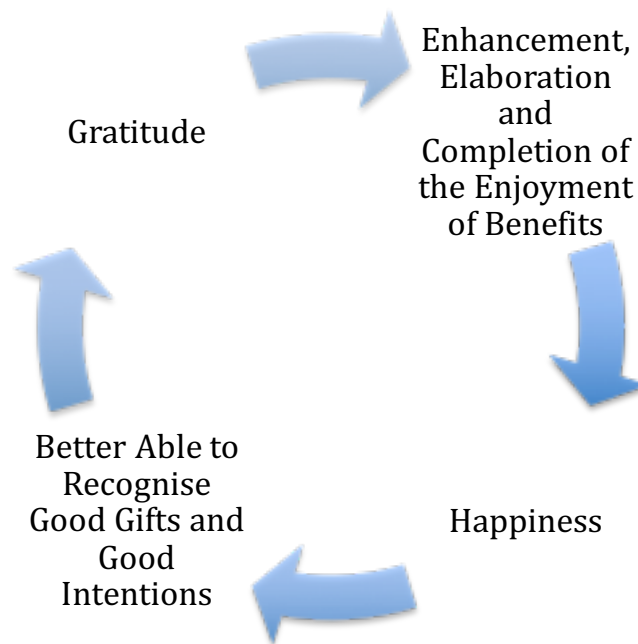


Figure 2. Adaptive cycle of gratitude and happiness (Watkins, 2004, p. 185).

The causal direction between gratitude and wellbeing is unclear as the identified literature relies on correlational methods administered at single points in time, however literature identifies several mechanisms through which gratitude may work to enhance positive affect and wellbeing. First, grateful individuals endorse high levels of agreeableness, extraversion, openness, and low levels of neuroticism, and thus they are better able to inhibit

the feelings associated with negative emotions (e.g. bitterness, anger, and envy) (Emmons & McCullough, 2004; McCullough et al., 2002). Second, Watkins (2004) argues that grateful people may be able to enhance their happiness through an increased ability to delay gratification. For example, in comparison to grateful people who have the ability to wait for benefits (e.g. a new car) until they can afford to do so, less grateful people may mortgage their future by buying benefits that they are not willing to wait for. Third, grateful individuals are also more likely to show a positive intrusive memory bias, even after controlling for depression. Watkins, Grimm, and Kolts (2004) found that individuals that were higher in trait gratitude were more likely to recall positive events when asked to do so and, when asked to recall negative memories, more positive memories came to mind. Gratitude may thus work to increase subjective wellbeing through recalling positive events that are likely to enhance their level of satisfaction with their own lives. Watkins, Uhdera, & Pichinevskiy's (2014) study investigated whether grateful processing is a critical mechanism that causes increases in happiness, or if the benefits are simply from the recall of positive events. In this study (n.b. other gratitude interventions are described in section 2.2.1), 129 undergraduate students were randomly assigned to one of three conditions, including a three-blessings pride condition (where they recalled events and listed three things that went well and how these events made them feel better than others or above average), a three-blessings gratitude condition (where they also recalled events, but how grateful they felt for each of these), or a memory placebo control. There were no significant between-group differences at post-intervention, however those assigned to the gratitude condition were significantly higher in wellbeing at five weeks' follow-up than those assigned to the pride and memory-control conditions. This study also found that men benefited more from the intervention than women, and those low in trait gratitude did. Continued practice of gratitude exercise did not contribute to enhanced wellbeing, however the increases in the gratitude condition even post-intervention, which has been seen in one other study (Seligman, Steen, Park, & Peterson, 2005), suggest that grateful

recounting processes events with deeper encoding, and thus works to train cognitive biases that are conducive to subjective wellbeing. More research is needed to confirm this theory, however.

A fourth mechanism is the ability to appreciate one's life circumstances. Appreciating what one has can work as an adaptive coping strategy as it allows grateful people to draw on positive emotions to positively reinterpret and extract the maximum possible satisfaction from problematic and stressful life experiences (Fredrickson, Tugade, Waugh, & Larkin, 2003). In one study, Froh, Emmons, et al. (2011) found that after controlling for materialism in youth aged 14-19 years ($n = 1035$), gratitude significantly ($p < .01$) predicted higher grade point average (.22), social integration (.76), and life satisfaction, (.79), in addition to lower levels of envy (-.32) and depression (-.51). Materialism on the other hand predicted lower grade point average (-.10), higher envy (.17) and lower life satisfaction (.14). Gratitude's stronger association with a wider range of positive outcomes is likely due to grateful people's abilities to appreciate what they have.

Related to this ability, McCullough et al. (2002) found that gratitude is inversely related to dispositional envy, and thus grateful people may be less likely to engage in upward social comparisons that lead to feelings of deprivation (White, Langer, Yariv, & Welch Iv, 2006). Gratitude may also counteract the effects of both *hedonic adaptation* – the tendency of humans to return quickly to a relatively stable level of happiness despite major positive or negative events or life changes (Brickman & Campbell, 1971; Kahneman, 1999) – and the *law of habituation* – the tendency of humans to get used to our current level of satisfaction even if one's circumstances are favourable (Frijda, 1988). As grateful people are thankful for what they have, they are less likely to take benefits in their lives for granted. Further support for gratitude's association with wellbeing comes from literature on gratitude interventions, discussed in section 2.2.1.

Social Outcomes

Gratitude is not an emotion unique to the individual, but one that has functions of social organisation and interaction (e.g. admiration, respect, trust) (Buck, 2004). Gratitude may reflect, motivate, and reinforce social actions in both beneficiaries and benefactors, as expressions of thankfulness are believed to stimulate moral behaviour (Fredrickson, 2004; McCullough et al., 2001). Gratitude has associations with a range of pro-social ties (e.g. support, forgiveness, and empathy) (McCullough et al., 2002), all of which may indirectly enhance one's health and wellbeing by buffering people from adversity (Froh, Bono, & Emmons, 2010). The mechanisms through which gratitude is associated with social outcomes are largely illustrated through Fredrickson's (1998) broaden-and-build theory of positive emotions. The theory posits that as opposed to negative emotions, which *narrow* people's thought-action repertoires and cause them to act defensively (e.g. to attack in response to fear), positive emotions *broaden* people's thought-action repertoires by widening the array of thoughts and actions that come to mind, and *build* their enduring personal resources. Fredrickson (2004) further proposes that people who regularly experience positive emotions are not stagnant, but instead "continually grow toward optimal functioning" (p.153).

Applying the broaden-and-build theory to gratitude, Fredrickson (2004) describes that the thought-action tendency sparked by gratitude appears to be the motivator to behave pro-socially oneself, either toward the benefactor and/or others. This can then build psychological and social resources, as over time the actions inspired by gratitude build and strengthen social bonds and friendships. As Fredrickson (2004) illustrates, people who regularly feel grateful are more likely to feel loved and cared for by others, thus fuelling 'reciprocal altruism', what Trivers (1971) describes as an index of enduring friendships and alliances.

Importance of fostering gratitude in youth

Emerging evidence illustrates gratitude's association with a wide range of outcomes that appear to be unique to adolescents. First, expressing gratitude can improve school satisfaction (Froh et al., 2008), itself related to academic success and satisfaction in other domains (e.g. family, friends, living conditions) (Whitley, Huebner, Hills, & Valois, 2012). Socially, Froh et al. (2010) describe the importance for youth to capitalise purposefully on the positive inputs of others by securing and building resources (such as assistance from others, knowledge, and opportunities), and establishing supportive relationships. They further indicate that because gratitude may instil a desire to repay benefactors or people in general, gratitude could help achieve social integration by building an individual's interest in helping others. Further, the building and strengthening of relationships may help youth academically as adolescents with high quality friendships fare better in school, itself a consistent predictor of academic growth and protective factor against high-risk behaviour (Resnick et al., 1997; Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce, & Burgess, 2006). Gratitude has also been linked to hope in early adolescence (Froh, Yurkewicz, & Kashdan, 2009). As hope increases trust in others, it should buoy youth's efforts to identify strengths and face new challenges (Froh et al., 2010).

2.2 Gratitude Interventions

As the above section illustrates, gratitude's association with an array of positive outcomes reinforces the importance of fostering this characteristic in youth. Literature identifies a wide range of gratitude inducing interventions (e.g. gratitude listing, three good things, gratitude self-reflection), many of which have had a range of positive associations from increasing wellbeing and school satisfaction, to treating body dissatisfaction and excessive worry (Emmons & McCullough, 2003; Geraghty, Wood, & Hyland, 2010a, 2010b;

Jackowska et al., 2015; Wood et al., 2010). The majority of gratitude interventions have been delivered through school, university, and workplace environments (Seligman et al., 2005; Wood et al., 2010), and recent literature reports the efficacy of self-directed, online interventions (Geraghty et al., 2010a, 2010b). The paragraphs below provide a brief overview of each of the primary gratitude interventions for youth and young adults, and are followed by a critical discussion of some of the common methodological limitations of these approaches. This subsection concludes with a brief review of how gratitude interventions can be enhanced.

2.2.1 Gratitude Interventions

Gratitude Listing

Of gratitude interventions, gratitude-listing interventions are the most common (Bono & McCullough, 2006; Emmons & McCullough, 2003; Froh et al., 2008; Seligman et al., 2005). Typically, these interventions ask gratitude condition participants to think about the things that they are thankful for and to write these thoughts down in a diary. Evidence illustrates a number of positive outcomes from this approach, including positive effects on wellbeing lasting up to 6-months post intervention (Emmons & McCullough, 2003; Seligman et al., 2005), and, in a clinical sample of people with depression, building a sense of connectedness, enhanced optimism and satisfaction with daily life, and reduced anxiety (Kerr, O'Donovan, & Pepping, 2014). In one example with youth, Froh et al. (2008) randomly assigned 11 classes of school children (mean age = 12.17, SD = .67) to one of three conditions; a gratitude-listing condition, a hassles condition, and a no-treatment control condition. Compared to those in the hassles condition, gratitude condition participants reported more gratitude at both post-intervention, and at the three-week follow-up. Post-intervention, gratitude participants reported higher life satisfaction over the past few weeks compared to hassle group participants, and higher school satisfaction compared to both hassle and control group

participants. At the three-week follow up, gratitude condition participants were more likely than hassle and control group participants to rate their upcoming week more favourably, and have higher satisfaction with school and where they live.

Grateful Contemplation

Grateful contemplation is similar to gratitude listing, but instead of cultivating feelings of gratitude, grateful contemplation aims to strengthen relationships by asking participants to think more deeply about their gratitude towards someone or something. In a brief gratitude intervention with 157 undergraduate students, participants who completed one of three gratitude contemplation tasks (i.e. thinking about, writing about, or writing a letter to someone for whom they feel grateful) had significantly higher increases in positive affect immediately after the task, compared to control condition participants who were asked to write about their living room layout (Watkins et al., 2003). Other studies have investigated the long-term effectiveness of gratitude contemplation interventions (Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011; Rash et al., 2011; Toepfer & Walker, 2009). For example, Rash et al. (2011) randomly assigned participants ($n = 56$, mean age = 22.5, $SD = 3$) to one of two conditions; in the gratitude condition, participants were asked to think “about items, people or events for which you are particularly grateful,” and to try “to experience and maintain the sincere heart-felt feelings of gratitude associated with that thought” (p.358). Participants were instructed to do this for five minutes, and to then write down their grateful experiences in a journal. Participants were asked to repeat this twice a week for four weeks, and were instructed to leave at least two days between each reflection process. Compared to memorable life event control condition participants (who had to try to feel and maintain the feelings associated with memorable events they recalled), gratitude condition participants reported significantly higher life satisfaction and self-esteem at post-intervention. Notably, Rash et al.

(2011) found that trait gratitude moderated the effects of the gratitude intervention on satisfaction with life.

Gratitude Visit

Gratitude visit interventions ask participants to write a thank you letter to someone who has done a lot for them, but also to read the letter to its recipient in person. In one such study, adult gratitude condition participants reported significantly higher happiness (as measured using the Steen Happiness Index) than control memorable life event participants both immediately post-intervention ($d = .49, p < .05$), and one week later ($d = .39, p < .05$) (Seligman et al., 2005). While large effect sizes were produced, the effects were short-lived and declined overtime through to six-month follow-up. In a similar study with children and adolescents, Froh, Kashdan, et al. (2009) found that there were no significant effects in either the gratitude condition or the control condition, however people low in positive affect pre-intervention had significantly greater increases in gratitude and positive affect scores post-intervention. Importantly, it may not be practical to schedule formal gratitude visits often (Seligman et al., 2005), and the approach may be less likely to be effective long-term because of their less intensive approach (Wood et al., 2010).

School Interventions

With increasing evidence for gratitude, gratitude interventions have also been employed as part of school curricula. Froh et al. (2014) randomly assigned classrooms of children (8-11 years) to one of two conditions. In the gratitude curriculum (aimed at strengthening children's schematic help appraisals), participants received structured lesson plans about the social-cognitive determinants of gratitude, including a benefactor's intentions and the costs experienced by benefactors, in addition to the benefits experienced by the beneficiaries. The lessons included classroom discussions, role-plays, and writing in a gratitude journal.

Participants in the attention control curriculum also received structured lesson plans and engaged in similar activities, however these focused on neutral topics (e.g. events of the day). Findings suggest that children in the gratitude condition showed a schematic change that made them more grateful and had benefits for their wellbeing. They were also more likely to express gratitude than those in the attention control condition. A second study, which used the same approach but was less intensive (i.e. weekly sessions for 5-weeks, rather than daily sessions for 1-week), found positive effects on both gratitude and positive affect, which remained significant five months post-intervention. Doing activities out of obligation may undermine intrinsic motivation (Ryan & Deci, 2000), however, these effects may be counteracted if a gratitude activity makes children feel competent, connected, and autonomous, all of which may foster intrinsic motivation (Layous & Lyubomirsky, 2014).

2.2.2 Methodologies

A number of methodological factors in the reviewed literature challenge the ability to compare the effectiveness of varying interventions. The following discussion outlines such challenges, in addition to important considerations when conducting research on gratitude.

Measures

Studies have used an array of outcome measures (e.g. school satisfaction, mood); however, primary outcome measures are gratitude and wellbeing. The Gratitude Adjective Checklist (GAC) (McCullough et al., 2002), the Gratitude Questionnaire-6 (GQ-6) (McCullough et al., 2002), and the Gratitude, Resentment, Appreciation Test-Short Form (GRAT-Short Form) (Watkins et al., 2003) are self-report measures of *dispositional gratitude*, with the latter two being the most developed and utilised (Watkins, 2014). In an empirical investigation, Froh, Fan, et al. (2011) investigated the psychometric properties of these three gratitude scales to determine their validity in use with youth (10 – 19 years), for whom there

are no specific gratitude measures. Results showed that all three had acceptable levels of internal consistency (i.e. $>.70$), however, the GAC measure had lower correlations with negative affect, and the GRAT-short form measure performed poorly with the 10-13 year old age group. The poor performance of the GRAT-short form was likely due to cognitive limitations of pre-adolescents and the items of this scale (Froh et al., 2011). This finding, coupled with the ambiguity surrounding the age at which gratitude emerges, suggests caution regarding the use of these gratitude scales with children under the age of 13 years. Notably, in this investigation (Froh et al., 2011), the word ‘gratitude’ was replaced with ‘thankful’, as the latter was reportedly used more often with youth when describing their experiences as a beneficiary.

Gratitude interventions rely largely on self-report scales to measure outcomes. While easy to administer, limitations of self-report include being subject to social desirability and haphazard responding, especially if the questionnaire is lengthy (Lucas, Diener, & Larsen, 2003; Miller, 2007). Indirect measures of gratitude that overcome the limitations of self-report include the implicit attitudes test and behavioural measures (e.g. “thank you” responses to favours). However, it is difficult to distinguish between gratitude, politeness, or indebtedness (Lomas, Froh, Emmons, Mishra, & Giacomo, 2014; Watkins, 2014). Gratitude has also been measured through gratitude intervention exercises themselves (e.g. a gratitude letter, gratitude journal), free response (answering questions about gratitude, such as reflecting on a grateful experience) and attributional measures (participants’ perceptions of helping scenarios, and whether the help is autonomously motivated or controlled) (Emmons et al., in press, as cited in Lomas et al. (2014)). Some studies have also asked participants to rate gratefulness for each of the experiences they list (Harbaugh & Vasey, 2014).

Like gratitude, a range of measures have been used to measure wellbeing, including the Subjective Happiness Scale [SHS] (Lyubomirsky & Lepper, 1999), the Satisfaction with Life

Scale [SWLS] (Diener, Emmons, Larsen, & Griffin, 1985), the Steen Happiness Index [SHI] (Seligman et al., 2005), the Positive and Negative Affect Scale [PANAS] (Watson, Clark, & Tellegen, 1988), and other measures where participants are required to rate 20-30 affect-terms related to wellbeing on a Likert scale. The shorter forms (i.e. SWLS, PANAS, and SHS) appear to be the most frequently-used with adolescents.

The concept of wellbeing is itself difficult to define, and thus may explain why there are so many different measures, or why some studies may use more than one measure. Diener (1984) identifies three hallmarks of wellbeing. First, wellbeing is subjective, with experiences of wellbeing differing between individuals. Secondly, subjective wellbeing is not just the absence of negative factors, but includes positive measures. Thirdly, subjective wellbeing is a global assessment, measuring all aspects of an individual's life. Other conceptualisations of wellbeing expand into what may contribute to one's wellbeing. Seligman (2011) proposes a wellbeing theory that has five elements that contribute to wellbeing, including positive emotion, engagement, positive relationships, meaning and achievement. The theory proposes that each of the elements can be defined and measured independently of each other, and people do not just engage in each element because they have to, but rather because they want to. A New Zealand project, described by Ball (2010) investigated young people's (Māori, Samoan, and Pākehā) perceptions on wellbeing and its predictors, identifying both social domains (e.g. culture, peer groups, family, school, sport, work, church) and physical domains (e.g. public space, transport, accommodation) (Edwards et al., 2003, as cited in Ball, 2010). The several measures of wellbeing (e.g. PANAS, SWLS, SHS) reflect varying dimensions of the identified conceptualisations, assessing mood, physical symptoms, overall life-appraisals, health, and coping behaviours.

Duration and Intensity

Typically, gratitude-listing interventions last for two to four weeks (Froh et al., 2008; Rash et al., 2011; Sheldon & Lyubomirsky, 2006), while gratitude contemplation interventions have lasted for as long as eight weeks (Lyubomirsky et al., 2011; Toepfer & Walker, 2009). The *intensity* of such interventions differs however. For example, in Froh et al.'s (2008) study, participants were required to do the gratitude-listing exercise every day for two weeks, whereas intervention participants in the study by Sheldon and Lyubomirsky (2006) were only required to do a gratitude list once, but were encouraged to keep it up over the next few weeks. Notably, this low-intensity study had no significant findings, which would support Wood et al.'s (2010) conclusion in their review that interventions which ask participants to make daily gratitude lists for up to two weeks are more effective than those that ask participants to do so once per week. This is not necessarily always the case however, and depends on the type of gratitude intervention employed and perhaps also differs according to the sample. In another study with a control condition and two different levels of intensity gratitude interventions, students who engaged in gratitude practice once a week showed higher increases in wellbeing compared to both the controls and those who practised gratitude three times a week (Emmons & McCullough, 2003), suggesting that more frequent gratitude practice may become boring for participants. The significant between group differences at the five-week follow-up in Watkins et al.'s (2014) study also emphasises the need for having a long follow-up period.

Attrition

Few studies have assessed attrition rates from interventions, making it difficult to investigate whether there is any difference in attrition rates between the varying delivery methods. Among youth, attrition from gratitude interventions appears to be low. This could

be because the majority of studies have restricted participation to school or university students, where participation may be linked with curricula or as a part of course credit, making attrition less likely (Froh et al., 2014; Harbaugh & Vasey, 2014). While Eysenbach (2005) cautioned that the lack of human contact in online self-help therapies means that attrition is consistently high, gratitude interventions appear to be enjoyable for participants. For example, Geraghty et al. (2010a) found that attrition was twice as high in a monitoring and restructuring condition, than in the gratitude condition. Wood et al. (2010) also report that in Seligman et al.'s (2005) study, participants were willing to continue the gratitude intervention even after data collection had stopped. In yet another study, gratitude treatment was the most preferred out of the three treatments (Watkins et al., 2014).

Conditions

Ensuring that gratitude is properly manipulated in gratitude interventions is vital. In one study identified by Watkins (2004), intervention group participants were asked to list gifts received over the Christmas holidays that they were thankful for, while the control condition were asked to think about gifts that they wanted, but did not receive. The study found no effect on mood. Watkins (2004) identified two possible reasons for this surprising finding. First, gratitude is not experienced to the same extent when one expects a benefit (McCullough et al., 2001). Second, people tend to be more grateful for non-material possessions (e.g. experiences, relationships). Interestingly, while the gratitude-listing approach allows people to attribute gratitude towards anything (including non-human sources), grateful contemplation and visit approaches may restrict people to being thankful towards people only.

Comparing the effectiveness of various gratitude interventions is further challenged by the use of varying control conditions (e.g. writing about daily hassles, daily events, early memories, living room layout, events that had an impact, or things that they wanted to do over

summer but could not) (Emmons & McCullough, 2003; Harbaugh & Vasey, 2014; Seligman et al., 2005; Watkins et al., 2003). It is important that control conditions do not inadvertently induce gratitude. For example, in one study, participants had to think about the ways in which they were better off than others (Emmons & McCullough, 2003). This downward social comparison could have resulted in an experience of gratitude however, as people may have thought about how things could have been worse for them (Watkins, 2004). Further, several studies have found a significant increase in wellbeing only when compared to a hassles condition (Emmons & McCullough, 2003; Froh et al., 2008; Sheldon & Lyubomirsky, 2006). While the trends in such studies were in the right direction and may have only required a larger sample size to get significant results (Wood et al., 2010), it cannot be concluded that these interventions are effective in comparison to more stringent control conditions where a positive mood may be elicited but unrelated to gratitude. In studies that have the potential to lead to decrements in wellbeing, it cannot be concluded whether it is the gratitude intervention that increases, or the control that decreases wellbeing, or a combination of the two (Watkins et al., 2014). Other studies have used no treatment control conditions (Emmons & McCullough, 2003; Froh et al., 2008; Lyubomirsky et al., 2005; Watkins et al., 2014) and wait-list control conditions (Geraghty et al., 2010a, 2010b), however such conditions do not control for non-specific treatment or placebo effects (Watkins et al., 2014).

Participant characteristics and self-selecting samples

Lyubomirsky and Layous (2013) propose a positive-activity fit model to explain how and why performing positive activities may make people happier. This model includes the mechanisms through which an activity may improve wellbeing (i.e. increasing positive emotions, thoughts and behaviours, in addition to need satisfaction). The model also proposes that the degree to which activities improve wellbeing are influenced by the features of the positive activities (e.g. dosage and variety), and the features of the person (e.g. motivation and

effort, efficacy beliefs, baseline affective state, personality, demographics, social support). The person activity fit component of this model proposes that the greatest gain in wellbeing from performing positive activities is where there is an optimal person activity fit (i.e. the greatest degree of fit between the features of the activity and the characteristics of the person). Among positive psychology interventions, research has found that women report a greater person activity fit for the activities of keeping a gratitude journal, acts of kindness and savouring, than males do (Gayton, Peura, & Thompson, 2015). As the rest of this section outlines, research has explored the characteristics of people who sign up to gratitude interventions.

Compared to other positive psychology interventions, gratitude interventions are more willingly self-initiated (Parks, Della Porta, Pierce, Zilca, & Lyubomirsky, 2012). Of gratitude interventions themselves, one study found that keeping a gratitude journal and writing a gratitude letter were both seen as equally as useful and socially acceptable, however writing a gratitude letter was perceived as less efficacious (Kaczmarek et al., 2015). This resulted in decreased self-initiation and completion of the gratitude-letter intervention compared to the gratitude-listing intervention. Interestingly, the study found individual differences where people with greater dispositional gratitude expected the intervention to be more socially acceptable, easier, and beneficial.

Nonetheless, studies may struggle in finding a true random sample to participate in a study. One study found that fewer depressive symptoms, greater trait curiosity, and being female were related to a greater likelihood that one will self-initiate a gratitude intervention (Kaczmarek et al., 2013). In another study that applied the theory of planned behaviour [TPB] (Ajzen, 1991) to predict motivation and engagement, stronger intentions to participate resulted from favourable attitudes, high perceived self-control, and social norm beliefs (Kaczmarek, Kashdan, Drazkowski, Bujacz, & Goodman, 2014). Curious people had high

utility, social norm, and self-control beliefs, while women also had stronger utility and social norm beliefs than men. Depressed adults perceived the exercise as difficult to perform (i.e. low utility beliefs and perceived control), however they did feel that others would value them taking part. Social pressure may help depressed people to motivate themselves to take part in an intervention because they are particularly sensitive to social rejection (Nezlek, Kowalski, Leary, Blevins, & Holgate, 1997).

In another study, Kaczmarek, Goodman, et al. (2014) investigated people's desire to complete a gratitude intervention and their likelihood of initiating one after receiving instructional support. Based on the TPB, it was hypothesised that instructional support could help people modify their beliefs about the intervention by, for example, addressing the *utility* of the intervention, providing advice from former participants to address *social norms*, and moderating *self-control beliefs* by reducing perceptions about the difficulty of an intervention. Contrary to this hypothesis, the provision of instructional support actually decreased desirability of gratitude interventions, hindering intentions to participate. Such evidence suggests that as gratitude interventions are relatively straightforward, participants will be able to work out what they need to do without such detailed instructions.

Moderating factors

There appears to be certain types of people that may be able to benefit more from gratitude interventions than others. The following describes moderating factors that may affect the impact of gratitude interventions. Firstly, research has found significant differences in the experience and expression of gratitude between *genders*, and several studies have found that men benefit more from gratitude interventions than women do (Watkins et al., 2014). Although men and women experience similar levels of positive emotions (Seligman & Csikszentmihalyi, 2000), women are more likely to recognise and express gratitude compared

to men, and to derive more benefits from its expression (Kashdan, Mishra, Breen, & Froh, 2009; Sommers & Kosmitzki, 1988). Kashdan et al. (2009) suggest that males may be more likely to conceal their experience and expression of gratitude because they may see it as a sign of vulnerability and weakness, and thus threatening to their masculinity. Interestingly, Watkins (2014) describes Aristotle's view that "gratitude was not becoming to the noble man, because expressing gratitude is admitting that other people have contributed to their wellbeing" (p.14). The correlations in Hoy et al.'s (2013) study that found that children's gratitude was significantly correlated with their mother's level of gratitude ($r = 0.23$) but not their father's ($r = 0.07$, n.s.) could thus be explained by the fact that children may find it harder to recognise their father's expressions of gratitude than those of their mother. Of the available literature on gender differences in youth themselves, evidence has found that girls are more likely to express gratitude for social situations and relationships, whereas boys are more likely to express gratitude for material possessions (Baumgarten-Tramer, 1938; Gordon et al., 2004).

Within-person factors that have been associated with gratitude include spirituality and personality traits (e.g. agreeableness, extroversion, and low neuroticism) (Adler & Fagley, 2005; Hoy et al., 2013; McCullough et al., 2002; Watkins et al., 2003). Other literature proposes that people who are high in gratitude have a low threshold for gratefulness (i.e., they are quick to become grateful when others would not), and tend to dwell on the positive factors of situations (Roberts, 2004; Rosenberg, 1998). Wood et al.'s (2010) schematic hypothesis proposes that a cognitive 'lens' biases the way that grateful people see the world, including that, compared to less grateful people, grateful people are likely to place greater value in other's actions, as they interpret other's helpful actions as being more altruistic. Motivation to increase one's happiness did not alter the intervention's effectiveness (Watkins et al., 2014).

Both Froh, Kashdan, et al. (2009) and Rash et al. (2011) found that people who were low in *positive affect levels* at the start of gratitude interventions had larger increases in

wellbeing than those who were higher in positive affect. Similarly, studies have found that gratitude interventions are most effective with those low in trait gratitude (Harbaugh & Vasey, 2014; Rash et al., 2011). For example, Harbaugh and Vasey (2014) found that among individuals who were low in trait gratitude, there were no changes in symptoms in the control condition, however symptoms declined among those in the gratitude condition (where they were asked to complete a gratitude-listing exercise for two weeks). A similar effect was seen for those high in depressive symptoms, with no change in depressive symptoms among control condition participants, but decreases among those in the gratitude condition. These findings support McCullough, Tsang, and Emmons' (2004) *resistance hypothesis*, which posits that people who are predisposed to being grateful may already experience the world in a positive light such that no additional positive experiences could lead to any further benefits. Similarly, Froh, Kashdan, et al. (2009) suggest that people high in positive affect may have achieved an 'emotional ceiling', and are thus are not susceptible to large gains in wellbeing.

2.2.3 *Enhancing the effectiveness of gratitude interventions*

The effectiveness of gratitude interventions could be enhanced in several ways. First, interventions could be tailored to the varying ways in which gratitude is experienced and expressed between groups (e.g. cultures, genders) (Lomas et al., 2014). Second, the effectiveness of gratitude interventions is highest when distributed on a regular basis, and when individuals willingly, and intentionally, engage with them in their everyday lifestyles (Lyubomirsky et al., 2005). Reminders to take part in gratitude exercises may thus encourage both the experience and expression of gratitude in everyday lives and help instil gratitude habits (Lomas et al., 2014). Further, it is possible that gratitude interventions could be strengthened through the use of booster sessions (Lomas et al., 2014). Finally, Lomas et al. (2014) argue that gratitude research will 'undoubtedly' explore how digital and electronic modes of communication will be used to promote gratitude. As this study explores, it is

possible that delivering gratitude interventions through technology may make it easier for individuals to engage with the intervention.

2.3 E-Health Promotion

Globally, the use of mobile phones, computers, and tablets continues to rise rapidly, as too will the development of new electronic devices (Hung et al., 2013; Jorm, Morgan, & Malhi, 2013; PewResearch, 2014). In response to this increased use and familiarity with a range of technologically advanced electronic devices, health services are increasingly utilising technology to communicate directly with consumers (e.g. appointment reminders, test results) and to deliver information (e.g. websites and social media) (Free et al., 2013; Thorn, 2014). Reflecting on the pace at which technology is developing and being used in health promotion, Gold, Lim, Hellard, Hocking, and Keogh (2010) anticipated that, "... health promotion will inevitably expand out from the 'old' media (TV, radio, billboards) and into the 'new' (mobile telephones, social networking sites)" (pp.1-2). This new area is commonly referred to as 'e-health promotion'; however, '*e-interventions*' is a broad term that encapsulates health promotion too, not just prevention programs, as the name would imply. Emerging literature lends support to e-health promotion interventions addressing a wide range of health issues (e.g. smoking cessation, sexual health, physical activity, mental health, weight loss, and alcohol consumption) (De Bourdeaudhuij, Stevens, Vandelandotte, & Brug, 2007; Hurling et al., 2007; Khadjesari, Murray, Hewitt, Hartley, & Godfrey, 2011; Lightfoot, Comulada, & Stover, 2007; Patrick et al., 2009; Rodgers et al., 2005).

E-health promotion initiatives appear to have largely kept at pace with various communication technologies (e.g. computers, mobile phones, tablets) and the novel features they offer (Bull & McFarlane, 2011). With the advancing capabilities in each of these electronic devices, exactly how they are used differs significantly between interventions and

will continue to evolve. Currently, key advantageous features include their reach (including reaching those who do not use health services regularly), standardised information, interactivity, privacy, autonomy, portability, convenience, flexibility in use, 24/7 access, frequent updates, and potentially lower costs through economies of scale (Bull & McFarlane, 2011; Donker et al., 2013; Ellis et al., 2013). Further, geographical location is not a barrier to participation, enabling the advertising of programmes to take place through a range of means (e.g. through internet and media advertising, email/phone mailing lists, and at health clinics, festivals, high schools, and tertiary institutions) (Cullen, Thompson, Boushey, Konzelmann, & Chen, 2013; Kypri, Langley, Saunders, Cashell-Smith, & Herbison, 2008; Lim et al., 2012; Rodgers et al., 2005; Whittaker et al., 2012).

As e-health promotion remains a foreign concept to many, it is helpful to draw on Rickwood's (2012) conceptualisation of technology-based youth mental health promotion through the components of the guiding health promotion model, the Ottawa Charter (World Health Organisation, 1986):

- **Supportive environments:** Opportunities for social support, typically found in face-to-face environments, can be extended through the use of online communication tools (e.g. chat rooms, groups) to reach those who are isolated by location and/or disability, or those who may wish to seek support anonymously.
- **Development of personal skills:** The internet provides youth with the opportunity to learn new skills through accessing health promotion information easily (e.g. about personal safety, food safety, nutrition). Interactive technologies also offer more sophisticated approaches to doing this.
- **Strengthen community action:** Internet communication tools (e.g. blogs, online forums) enable people to engage with local and social communities on issues.

- **Building healthy public policy:** Internet communication tools (e.g. websites, Twitter, political chat rooms) enable youth to influence public policy by expressing their political views on areas that affect their health and wellbeing.
- **Re-orientation of health services:** Re-orienting health services towards technology-based health promotion approaches will provide ever-expanding ways to promote health and treat illness (e.g. through prevention, early intervention, standard treatment, and continuing care and recovery).

Specific to mental health, literature on e-health *promotion* is scant in comparison to the plethora of e-mental health *interventions* that support people with mental health problems (Merry et al., 2012; Rickwood, 2012; Virginia, 2011). Advantages of e-mental health interventions include increased service access, improved patient-physician interaction, and higher treatment compliance (Gaggioli & Riva, 2013). Notably, in contrast to mental health promotion, which acknowledges the many determinants of health, self-monitoring approaches may risk reducing attention from the socio-cultural dimensions of health as the approach places emphasis on the individual (Seko, Kidd, Wiljer, & McKenzie, 2014), and thus be at odds with the goals of health promotion. However, the mix of these has shown valuable contributions to behaviour change (Clarke et al., 2015), and their techniques offer important contributions to health promotion.

Acceptability and Engagement

E-health promotion interventions may be particularly popular and appropriate for use with youth who, aside from being the most frequent users of modern wireless technologies, tend to prefer support from informal sources (e.g. technology, friends and family) to professional sources (e.g. counsellors, health care professionals) (Collin et al., 2011; Gould, Munfakh, & Lubell, 2002). Technology also enables youth to seek help anonymously and

autonomously, which is particularly advantageous to those seeking help for sensitive health topics or stigmatised behaviours (Khadjesari et al., 2011), and those preferring self-help approaches (e.g. young men) (Ellis et al., 2013). In a New Zealand study investigating the views of alternative education students ($n = 39$; 74% males 49% Māori, 38% Pacific Island, aged 13–16 years) on depression, help seeking, and computer programmes to assist depression, Fleming, Dixon, and Merry (2012) found that although participants were very reluctant to talk about depression with health providers, their interest in computer games to assist depression was high.

Although literature suggests that drop out from technology-based interventions is commonly high (Donker et al., 2013), studies with youth appear to have relatively high engagement. In a study investigating the use of a mobile phone program to monitor mood, stress, and coping, 76% of youth participants completed entries over the seven-day monitoring period (Reid et al., 2009). Another study demonstrating high engagement found that 86% of participants using a computerized game targeting depression completed at least four of seven modules, while 60% completed all seven (Merry et al., 2012). To assist with engagement, studies may use pre-notice letters and reminder emails/text-messages (Kypri et al., 2004; Lim et al., 2012). Whether drop out varies according to delivery mode or participant characteristics is unknown, however engagement can be challenging if youth do not perceive the intervention topic as applicable to them (Redzic et al., 2014).

Interestingly, a recent study reported that the increasing delivery of mental health services online was based on the *assumption* that young people preferred to seek help online (Bradford & Rickwood, 2014). The majority of participants ($n = 231$; 15-19 years) preferred to seek help face-to-face (58.9%), compared to 16% who preferred to seek help online, and 1.3% who preferred to seek help by phone. Of particular concern is that a large number of people preferred not to seek help at all (23.8%), suggesting that there is still an overall

orientation to not seek help, and/or that barriers persist (e.g. self-stigma, shyness, emotional competency) (Bradford & Rickwood, 2014). Drawing on a functional approach to attitude change (Katz, 1960), Bradford and Rickwood (2014) suggest that the few participants preferring to seek help online is not surprising as young people may need to experience the help-seeking process to determine whether it overcomes the barriers and/or concerns they have. Fleming and Merry (2013) also found that youth work service providers, who were largely supportive of the use of computer-based cognitive behavioural therapies (e.g. SPARX, described in section 2.3.1), wanted to be able to deliver such therapies in group settings to extend its reach to vulnerable youth, thus increasing access and assisting the functional approach to attitude change.

Challenges

While it is evident that technology offers a convenient, novel approach for consumers, the literature highlights some concerns, including ethical concerns for safety, privacy, data security, and confidentiality (Bull & McFarlane, 2011; Luxton, McCann, Bush, Mishkind, & Reger, 2011; Torous, Friedman, & Keshavan, 2014; Virginia, 2011). Consistent concern also surrounds the digital divide, a social and economic inequality resulting from an unequal access to technology. Although technology access and use has increased, unequal access to technology extends to those without the latest technologies who may not be able to access interventions that require advanced technology features (e.g. smartphones, fast internet connections) (Bull & McFarlane, 2011). A digital divide could also result from a reluctance to use technology, whether this is due to unfamiliarity, privacy concerns, or some other factor. Other potential barriers to participation may include perceived costs, fear of parents/friends finding out, and technical illiteracy (Bull & McFarlane, 2011; Perry et al., 2012; Willoughby, 2013), and may be especially true of interventions that offer two-way interaction.

In practice, key challenges include having less control over who signs up to an intervention and completes it. Interventions can also be time consuming for staff (e.g. finding new information to share on a website and/or social media, monitoring replies to text-messages) (Bull & McFarlane, 2011; Norman, 2012). Common research challenges include small sample sizes, selective samples (e.g. university students), self-reporting measures (subject to memory error and reliability concerns), skewed data, and few longitudinal studies (Khadjesari et al., 2011; Miller, 2007). High loss to follow-up is another challenge (Bailey et al., 2013; Bull & McFarlane, 2011), and while studies may still have enough power to find significant effects, a bias could be created whereby those who drop out of the study differ from those who remain (Lim et al., 2012). Further, it is also possible that people who voluntarily sign up to interventions may already be motivated to change their behaviour. In addition, high education and literacy levels are likely to be necessary for many of these interventions.

Likely due to a lack of standardised measures, there are numerous features of e-interventions that have not been well evaluated, including engagement, message content, duration, intensity, and cost-effectiveness. In addition, there is an absence of research investigating e-interventions' real life feasibility, their effectiveness long-term, and effectiveness in low- and middle-income countries. Further, few studies have used theory to inform their interventions (Buhi et al., 2013), despite evidence suggesting that more extensive use of theory (such as SCT) is associated with larger effect sizes (Webb, Joseph, Yardley, & Michie, 2010). Technological obsolescence is another key challenge, with popular technologies rapidly being replaced by emerging technologies (Jorm et al., 2013). Therefore, by the time an intervention is researched and showed efficacy, the technology approach used may be obsolete (Bull & McFarlane, 2011). The following reviews the relative strengths, limitations, and acceptability of internet- and mobile-phone-based approaches, two

technologies that are at low-risk of becoming obsolete due to their popularity and proven effectiveness in addressing a wide range of health issues.

2.3.1 Internet-based health promotion

Internet use is increasing rapidly with over three billion users worldwide at the end of June 2014, a 741% increase since 2000 (Internet World Statistics, 2015). One US study found that, in 2009, young people (8-18 years) spent an average of 7.5 hours online each day (Rideout, Foehr, & Roberts, 2010). Such figures among youth are likely to have increased substantially as social networking sites have become more popular, and as schools increasingly require students to bring their own internet-enabled devices. Such high use demonstrates its suitability as a medium for reaching and delivering health promotion interventions to youth, an approach that has grown rapidly in recent years. In a recent systematic review of online mental health promotion studies published since 2000, two-thirds (67.8%) of the studies were published since 2009 (Clarke et al., 2015). Key internet features that demonstrate its suitability as a medium for delivering health promotion interventions include the ability to reach a large number of people from a targeted population quickly and efficiently (including those who may not have otherwise had access) while remaining relatively low-cost (Bailey et al., 2013; Bull & McFarlane, 2011; Clarke et al., 2015; Cullen et al., 2013). Of particular benefit to research is the internet's capability for automated randomisation, real-time website updates, blind allocation to study conditions, and easy data collection (Bailey et al., 2013; Bull & McFarlane, 2011; Tait & Christensen, 2010). For users, internet-based approaches offer convenient, interactive, and readily available approaches that youth are already familiar with and can complete at their own pace, and also offer confidentiality and autonomy (Bailey et al., 2013; Cullen et al., 2013; Redzic et al., 2014). As discussed below, delivery modes of internet-based health promotion approaches are plentiful.

Self-Guided Health Education Websites

Increasingly, people are using the internet as a tool for self-education on health-related topics (Hung et al., 2013). A lack of published literature on websites detailing preventive health practices means that their effect on behaviour change is unknown, however they are likely to work towards the ‘Development of Personal Skills’, one of the components of the Ottawa Charter. One example is ReachOut.com, a popular Australian website (average of 96,508 views per month) aimed at providing young people (14-25 years old) with information on mental health and wellbeing, in addition to supportive tools, skills, and connections to assist people in accessing support when necessary (Collin et al., 2011). A user-profiling survey with respondents ($n = 1552$) aged 14-25 years (76% female) found that a large number of respondents (43.3%) felt that the website had helped them ‘quite a bit’ or ‘a lot’ to learn skills, knowledge and confidence to seek help if they needed it, while 35.2% said that it had helped them ask for professional help ‘quite a bit’ or ‘a lot’. Collin et al. (2011) speculate that there may be a ‘dose-response’ relationship, whereby the more times an individual accesses a site, the better its effectiveness on mental health literacy and help seeking. However more evidence is needed to illustrate the effects of such websites on behaviour change.

Web-based Interventions

Web-based interventions that are tailored to individuals are also plentiful and have been evaluated as successful in improving a wide range of healthy behaviours, including weight-loss, physical activity, sexual health promotion, and reducing alcohol consumption (Bailey et al., 2013; De Bourdeaudhuij et al., 2007; Tait & Christensen, 2010). Typically, web-based interventions require participants to log on weekly, to set goals, complete activities, and to monitor their own progress (Cullen et al., 2013; Thompson, Cullen, Boushey, & Konzelmann, 2012). In New Zealand, a number of studies have investigated the effectiveness of web-based

brief interventions on alcohol consumption (Kypri et al., 2013; Kypri, Langley, McGee, Saunders, & Williams, 2002; Kypri et al., 2008; Kypri & McAnally, 2005; Kypri et al., 2004; Kypri et al., 2014). Typically, these involve randomly assigning participants who screen positive for hazardous or harmful drinking (as measured using the AUDIT-C brief screening measure; (Bradley et al., 2007) to an intervention or a control condition. In the intervention condition, participants receive personalised feedback on their drinking habits (e.g. monetary expenditure on alcohol per month, comparison to average population of the same age/gender). Such interventions have been found to be effective in addressing a wide range of outcomes (e.g. reducing total alcohol consumption, fewer personal and academic problems) remaining significant at six and 12 months post-intervention (Kypri et al., 2008; Kypri et al., 2004). Evidence suggests that there is no additional effect of repeating the intervention (Kypri et al., 2008). Although a more recent study found few significant findings between intervention and control conditions (Kypri et al., 2014), evidence has demonstrated the intervention's effectiveness with Māori university students in a large RCT ($n = 1789$). Kypri et al. (2013) found a 22% difference in weekly drinking at 5-month follow-up, a much larger effect than face-to-face interventions delivered in primary health care settings (13%) (Kaner et al., 2007). Brief interventions may also remove barriers to discussing health issues, an important consideration as university students are unlikely to self-initiate a discussion about their drinking with health-care professionals (Kypri et al., 2002). Notably, participant support (both face-to-face, or online) has been identified as an important feature to support the completion and outcomes of interventions (Fridrici & Lohaus, 2009; Sethi, Ellis, & Campbell, 2010).

Online Games

Online games are a relatively new approach for health promotion. A systematic review found only two studies that focused on online gaming for youth mental health promotion, but conclusions were challenged by the lack of control conditions and high numbers of drop out

(Clarke et al., 2015). Supporting literature on the characteristics of video games that demonstrate their potential for delivering messages and leading to positive health behaviour change include their engaging, attention-maintaining properties, extensive player involvement, and interactivity (Baranowski, Buday, Thompson, & Baranowski, 2008). Video games are also able to support components of behaviour change theories (e.g. Social Cognitive Theory [SCT] (Bandura, 1986)) by including goal-setting exercises, for example (Baranowski et al., 2008). A New Zealand example is SPARX, an interactive, three-dimensional fantasy game designed to deliver computer based cognitive behavioural therapy [CBT] for the treatment of clinically significant depression. The game's setting is a fantasy world that is dominated by 'Gloomy Negative Automatic Thoughts' (GNATs), where users chose an avatar and undertake a series of challenges that work towards restoring the balance of GNATs. In each of the seven modules, users interact with a guide who sets challenges, provides education, and gauges mood. If a person's mood is not improving, they are prompted to seek additional help. In a RCT with adolescents ($n = 187$, 12-19 years) with clinically significant moderate to severe depression scores (between 10 and 19 on the PHQ-9 measure) (Kroenke, Spitzer, & Williams, 2001), SPARX was found to be as effective as treatment as usual (i.e. face-to-face counselling) (Merry et al., 2012). There was a low drop out rate in both groups (9%) and, in the SPARX condition, 86% of participants completed at least four modules, while 60% completed all seven.

Social Media

Social networking is now an established part of the online environment, with young people being the most frequent users of social networking sites (e.g. Facebook, LinkedIn, Twitter) (Gold et al., 2011). The increasing use of social media and its interactive functionality has prompted calls for its use in health promotion to not only facilitate behaviour change, but also to facilitate social relationships (Gold et al., 2011; Norman, 2012).

In contrast to other media forms (e.g. radio, print, and television), social media's interactive capabilities support health promotion in working towards strengthening community action, developing personal skills, and creating supportive environments. Other benefits of social media include its ease of use, low cost, easy study replication, and, as social media is all 'cloud-based', reduced reliance on specific devices (Dunne, McIntosh, & Mallory, 2014; Norman, 2012). Social media is also a valuable means of recruiting participants in a cost-effective manner, especially with youth and hard-to-reach populations (Park & Calamaro, 2013). Gold et al. (2011) found that the most popular pages promoting good sexual health were those that encouraged interactivity by posting regular posts and delivering a range of content designed for use on social media (e.g. videos, links, and by asking questions). While social media appears to be a promising approach to reaching and interacting with youth, in addition to enhancing awareness of health issues and help seeking behaviours (Livingston, Tugwell, Korf-Uzan, Cianfrone, & Coniglio, 2013), there is no evidence regarding its effectiveness on behaviour change and/or increasing health-related knowledge.

Limitations and challenges of Internet based approaches

While the potential strengths of internet-based health interventions are plentiful, limitations do exist. These include the tendency for interventions to be site-specific, only being compatible on desktop-based web-browsers, and requiring users to log on frequently (Lathia et al., 2013). Internet interventions also have to compete for users' attention with numerous other distractions (e.g. social media, advertisements, news sites, games etc). Such limitations could affect adherence and engagement, especially with an adolescent audience. Reviews have highlighted high drop out and non-completion of mental health promotion and prevention interventions with young people (Clarke et al., 2015; Mohr, Burns, Schueller, Clarke, & Klinkman, 2013; Richardson, Stallard, & Velleman, 2010). This represents an important area of future research to investigate how those who drop out from interventions

may differ from those who do not. There is evidence to suggest that greater adherence and engagement is associated with better outcomes in internet-based interventions for youth mental health (Christensen, Gibson, Griffiths, & O'Kearney, 2006; O'Kearney, Kang, Christensen, & Griffiths, 2009), however this conclusion cannot be generalised as it may be context dependent (Mohr et al., 2013). The self-report requirements of many internet-based approaches may also be subject to reconstruction bias, and thus not truly reflective of an individual's behaviour (Lathia et al., 2013). Finally, internet-based interventions that allow users to interact amongst themselves (e.g. social media platforms) have the potential to contaminate study conditions. Mobile phone interventions may offer an innovative solution to such limitations.

2.3.2 Mobile-phone-based health promotion approaches

Globally, 91 percent of people are estimated to have access to a mobile phone (DigitalBuzz, 2013). Mobile phones have rapidly expanded in functionality while decreasing in cost, and thus their ownership is not restricted by demographic or socio-economic status. Mobile phone interventions enhance the potential of reaching under-served and hard-to-reach groups (e.g. youth, those who change their address frequently, or those not accessing health services regularly) (Proudfoot, 2013). It has been argued that mobile phones 'lend themselves' to mental health care because they are often carried on the person, turned on and can be connected to the internet (in the case of 'smartphones'), thus providing an opportunity to access information and personalised support anytime and anywhere (unlike face-to-face therapy), in addition to collecting data in real-time (Guerriero et al., 2013; Proudfoot, 2013; Shaw & Bosworth, 2012; Virginia, 2011). Other benefits of mobile-phone approaches in health promotion are that interventions are relatively easy to deliver, update, and transfer data, in addition to monitoring engagement and exposure (Bull & McFarlane, 2011; Fjeldsoe, Marshall, & Miller, 2009). Mobile-phone-based approaches in health promotion are also one

of the lowest cost approaches, however it is important to be mindful of the costs incurred to users (Buhi et al., 2013) through increased charges from greater use (e.g. through calls, text-messages, and data use).

Text-message interventions

SMS, better known in New Zealand as text-message, allows people to send short messages (of less than 160 characters) to others almost instantly, regardless of time or place, and has rapidly become a main form of communicating (Buhi et al., 2013; Fjeldsoe et al., 2009). Like the internet, use of text-message is highest among youth. Rideout et al. (2010) found that youth (in the US) aged 8-18 years sent an average of 118 text-messages per day (equivalent to about 1.5 hours of text-messaging). Another US study found that over 50% of adolescents sent at least 50 text-messages per day (Lenhart, Ling, Campbell, & Purcell, 2010). Text-messaging appears to be a popular medium for youth to access help services. A recent survey by Youthline, a New Zealand-based youth helpline, found that 91% of its 80,085 contacts in the past year contacted the helpline via text-message (Young New Zealanders seek support via text message, 2015). Text-message-based health promotion approaches have been found to be effective in promoting a wide range of positive health behaviours, including positive sexual health, positive mental health, smoking cessation, weight-loss, nutrition, and tooth brushing (Blackburn & Blatnik, 2013; Fjeldsoe et al., 2009; Hebden et al., 2013; Hingle, 2011; Lim et al., 2012; Rodgers et al., 2005; Schluter et al., 2015; Whittaker et al., 2012). Several internet-based interventions have also used text-messages to encourage engagement and/or to send motivational messages (Webb et al., 2010). Two reviews have concluded that text-message-based interventions are promising; however, more research is needed to draw conclusions about their cost-effectiveness in health promotion, and their effectiveness in comparison to face-to-face interventions (Buhi et al., 2013; Fjeldsoe et al., 2009).

In addition to the general advantages of technology-based and mobile-phone-based interventions, text-messaging has a number of advantages for users in particular. First, the simple and brief nature of text-messages may appeal to youth, who may also appreciate the private, confidential and non-confrontational approach of many interventions (Perry et al., 2012; Waller, Franklin, Pagliari, & Greene, 2006). In a New Zealand study that interviewed 15-18 year old ($n = 21$, 16 female, 5 male) users of Youthline's text-counselling service, key themes that emerged regarding what was important to them about the service included its personal approach, privacy, anonymity, autonomy and control, accessibility, and connection (Gibson & Cartwright, 2014). Text-messaging was also viewed as a comfortable and legitimate communication form, which users could do privately even when out with friends, for example (Pearson, 2015). The ability to store text-messages allows users to look back over their text-message history for reference (Haxell, 2014). Without distractions of face-to-face social interaction, text-messaging also allows users to have greater command over a message's expressive content (Reid & Reid, 2010). The approach has also been evaluated by youth as a more personal means of health promotion, and the information as more 'casual' than if a doctor or teacher was providing it (Gold et al., 2010). Text-message-based interventions have varied in their emotional tone, interaction, duration, and study design. The following reviews such features.

The *emotional tone* of text-messages is often upbeat, catchy, and engaging. For example, in a sexual health promotion study, Lim et al. (2012) used short and catchy text-messages; for example, "Chlamydia: hard to spell, easy to catch-Use a condom" (p.70). Notably, although 69% of participants found the text-messages entertaining or interesting, 24% found the text-messages annoying. The majority of such participants may have been among older age groups, or those that were already practicing healthy sexual health behaviours. Other literature targeted at behaviour change (healthy eating) highlights young people's preferences for

directive (i.e. informative content) over reflective (i.e. questions that make them think) text-messages (Woolford et al., 2011).

The majority of text-message-based interventions facilitate some type of interaction with participants, but vary in the *frequency* and/or extent of *interaction*. For example, some interventions have sent mass text-messages, to which participants may be expected to reply (Cocosila, Archer, Brian Haynes, & Yuan, 2009; Schluter et al., 2015), or may not (Armstrong et al., 2009; Lim et al., 2012; Newton, Wiltshire, & Elley, 2009). Text-messaging's conversational nature may make people may feel the need to reply more quickly than if something was sent over email (Lam, 2013); however, users may thus falsely expect immediate responses to the message they sent. Therefore, it is important to clearly specify the expected response time with clients (Luxton et al., 2011). Other studies have personalised text-messages to an individual's characteristics (Rodgers et al., 2005). In this particular study aimed at smoking cessation (Txt2Quit), intervention group participants could also prompt a reply on demand to receive advice on how to manage a craving. Text-message-based interventions may interact through text-message alone, text-message and internet, text-message and email (e.g. a newsletter with helpful links), or text-message, internet, and another mode of engagement (e.g. paper diary, clinic visits, phone calls) (Buhi et al., 2013; Fjeldsoe et al., 2009; Lim et al., 2012). Other studies have used multimedia message services (MMS), offering greater interactivity through video messages and animated cartoons (Whittaker et al., 2012). Whether one delivery mode has any distinct effectiveness over another is unknown; however, such personal contact may assist internet-based interventions to promote behaviour change (Webb et al., 2010).

Reviews have found that text-message-based interventions have ranged from four weeks to one year in *duration* (Buhi et al., 2013; Fjeldsoe et al., 2009). In one review, Fjeldsoe et al. (2009) found that the frequency of text-messages often reflected the expected

frequency of the targeted behaviour. Notably, in Txt2Quit (Rodgers et al., 2005), the frequency of text-messages varied: in the week leading up to the ‘Quit Day’ specified by each participant, and for the four weeks after, participants received five text-messages per day. However, thereafter, they received just three per week (aimed at maintaining cessation) and represents how the intensity of an intervention itself may differ depending on stages of behaviour change.

Regarding *study design*, text-message-based interventions typically compare intervention conditions to a minimal intervention control condition (Lim et al., 2012; Rodgers et al., 2005). By contrast, Whittaker et al. (2012) used an ‘attention control’ condition, where the frequency and type of messages were the same (e.g. video), but their content focused on other topics (e.g. healthy eating, environment sustainability, and cyber-safety). Monitoring and follow-up periods have also varied; some interventions have collected data solely from the replies to text-messages (Schluter et al., 2015), while others such as Lim et al. (2012) have asked participants to complete follow-up questionnaires up to 12-months post-intervention. The latter typically sees significant drop off at long-term follow-up. Other notable design features include a nine-day run-in period to ensure that participants could view the message content (including the videos and website), and also to allow participants to share initial messages with friends without potentially contaminating the conditions (Whittaker et al., 2012). Studies have also asked participants open-ended questions evaluating the study (e.g. perceived usefulness, strengths, and limitations) (Whittaker et al., 2012), thus contributing to emerging practice and research.

Smartphone-application-based interventions

The advancing capabilities of smartphones are not only replacing other technologies such as GPS and cameras (Miller, 2012), but are also providing novel, interactive ways to

deliver interventions and understand human behaviour (Lathia et al., 2013). Software applications, commonly known as “apps”, were first available in 2008 (Donker et al., 2013). Both the iTunes and Android “app stores” (online retailers who sell the applications) each have over one million apps available for download, which is almost double the number that were available in each store in 2012 (Statista, 2015). In a review of e-health promotion interventions, the majority (70%) of the 17 reviewed studies used technologically-advanced functions (e.g. apps, multimedia messaging) over text-message and voice features (Seko et al., 2014). A review of 21 health-promotion-focused applications found that the majority focused on nutrition, fitness, and physical activity (Bert, Giacometti, Gualano, & Siliquini, 2014). Apps have also demonstrated enormous potential in mental health care, including broadening the reach and use of evidence-based applications, preparing patients for treatment, actively engaging patients in their care (e.g. homework tasks, real time symptom monitoring), and enhancing care upon treatment completion (Price et al., 2014). All of these may reduce the need for face-to-face sessions, and work to reduce the likelihood of relapse (Price et al., 2014).

Increased attention has been given to the various sensors that are included in smartphones. Built-in and plug-in sensors (e.g. biofeedback sensors) allow for passive data collection of behaviour and emotions in real-time, helping to establish what triggers result in a certain behaviour (Lathia et al., 2013; Luxton et al., 2011; Miller, 2012). The future development of apps will improve the breadth and precision of sensors, improve interactivity with other devices/external sensors, and enable apps to collect data passively without consuming considerable battery life (Miller, 2012; Price et al., 2014). It has been argued that apps should be seriously considered as research tools as they have the capacity to run questionnaires, for example, their cost is minimal in comparison to other technologies (e.g. MRI scanners), and software does not have to be funded and developed by researchers (Miller, 2012). Few studies have actually been evaluated however (Donker et al., 2013), and thus there

is a real need for research as apps that have not been evaluated have the potential to put patients at risk, and could lead to increased patient care costs (Price et al., 2014).

Limitations and challenges of mobile-phone-based approaches

The reviewed literature illustrates two distinct approaches to delivering interventions using mobile phones. Smartphone apps appear to be a more popular approach than text-message, however it is important to be mindful that apps require substantial preparation, and collected data has the potential to be large and complex (Miller, 2012). In a systematic review of smartphones and health promotion, the main risks identified to their use include the lack of monitoring, the confidentiality of data, the digital divide, and excluding health professionals from a patient's management (Bert et al., 2014). Smartphones may also have a slow uptake amongst some people (e.g., people who see them as intrusive, demanding, or threatening their privacy) (Miller, 2012). Further, some mobile phones may not be compatible with advanced features (e.g. apps), potentially compromising an intervention's reach. While such factors could result in a selection bias, Miller (2012) argues that the rapid uptake of mobile phones means that recruitment biases will, in the near future, be minimal in comparison to other approaches. Nonetheless, it may be difficult to retain participants who can easily uninstall an app if it does not work for them.

Technology-related issues that could affect the delivery of mobile phone based interventions (regardless of delivery mode) include poor phone coverage and battery life. Battery life may be especially compromised with apps that use greater amounts of electricity (e.g. GPS tracking) (Miller, 2012). In mental health care, technology failures could put remote, high-risk patients at risk, and thus having a back-up plan devised between the provider and client is crucial (Luxton et al., 2011). Concerns have also been expressed about privacy and data security (Lathia et al., 2013; Miller, 2012; Price et al., 2014). At least for data stored on

the phone itself, users can take steps to maintain privacy through measures such as securing their phone with a password, and/or setting it up to be able to locate and delete data remotely (Price et al., 2014). There has also been concern expressed in the literature in relation to the use of mobile phones, especially with adolescents. Vacaru, Shepherd, and Sheridan (2014) found that focus group participants ($n = 45$, 13–18 years) emphasized the ease at which bullying can take place through text-message, in addition to sleep disturbance, physical pain from the overuse of mobile phones, and misinterpreting text-messages.

2.3.3 Summary of e-Health Promotion

Due to the varying approaches and targeted health behaviours, it is unknown whether one e-health promotion approach is more effective than another. However, such variability provides users with choice and flexibility, and is likely to appeal to diverse groups. The literature illustrates what is needed for e-health promotion to move forward and benefit the population at large. First, there is a clear need for research into the plethora of technology-based approaches available, many of which are not evaluated. Such lack of evaluation could be due to a commercial and economic motivation over research motivation (Martínez-Pérez, de la Torre-Díez, & López-Coronado, 2013), in addition to the fact that traditional research methods do not match the fast pace of technological development (Miller, 2012; Price et al., 2014). To enable the development of a stronger evidence base, flexible, iterative methodologies are needed. Due to the cost of developing technological interventions and the ‘rapidly shifting’ technological environment, intervention ideas should be presented to users quickly (Schueller, 2014). Involving a target population as stakeholders in the development of apps also works towards generating perceptions of ownership, strengthening user motivation, and facilitating user acceptability (Farrington et al., 2014).

Other considerations for e-health promotion approaches are that they have little control over the social and physical environments of their participants, and there are specific ethical considerations (e.g. getting true informed consent, maintaining confidentiality and anonymity) (Bull & McFarlane, 2011; Miller, 2012). Several advanced skills are also needed for the development of technology-based approaches, such as technical knowledge and programming skill, usability testing, and maintenance (Price et al., 2014). Such considerations are manageable and should not stop research and practice in this area, especially as there is a strong need for more research in this field. As one blogger describes, we are still “waiting for the wedding” between mental health and technology (as cited in Farrington et al., 2014).

2.4 Present Study

Youth mental health is a significant issue in New Zealand. Despite a strong need for early intervention to prevent, or minimise the impact of, mental health problems, youth are not likely to seek help for mental health problems. Even if youth do seek help, face-to-face services will be unable to cope with demand if more people seek treatment, and thus alternative delivery methods are required (Rickwood, 2012). Health promotion is one approach to deliver interventions to youth with or without mental illness, and could work to prevent and/or minimise impact of mental illness. Of e-health promotion approaches, text-message-based approaches appear to have the broadest reach with youth as their ownership and use is higher than that of the internet, and, unlike smartphones, they do not rely on advanced technological functions. In light of the evidence reviewed in this chapter, it is surprising that few studies have investigated the effectiveness of mental health promotion interventions that are informed by positive psychology constructs, or that are delivered over text-message.

As this review has illustrated, emerging literature continues to clarify some of the ambiguity surrounding the nature of gratitude. While there is some evidence of a biological basis to the development of gratitude, the reviewed interventions demonstrate strong, positive environmental influences that need to be acknowledged. Of positive psychology interventions, it has been argued that gratitude interventions demonstrate the largest effects on enhancing wellbeing, and that adolescence is a critical time for these interventions to be delivered (Froh, Kashdan, et al., 2009). Gratitude's association with a wide array of positive outcomes demonstrates its potential utility as a positive psychological construct that may counter tendencies towards negative thought patterns and promote positive youth development.

While gratitude-listing interventions appear to be the most widely supported intervention, the approach requires consistency and engagement with the diary exercise. Young people in particular may struggle with the demands of self-regulation required to carry out such a reflective task, and thus such a delivery approach has the potential to impose a significant impediment to an adolescent audience. While previous studies have found low attrition rates, this could be because participants are required to take part due to the connection with educational curricula or participation for course credit at universities. Thus, a significant gap in the literature is determining how well a gratitude intervention would work with adolescents who are not necessarily enrolled in a school or university. Further, no studies have looked at the effectiveness of gratitude interventions with at-risk youth. This is an important gap because the literature has shown that there are some people who may particularly benefit from a gratitude intervention (e.g. those low in trait gratitude, and/or those high in depressive symptoms). Finally, several of the gratitude intervention studies have found small effect sizes or even no significant effects from the gratitude intervention when compared to a no-treatment control group. These findings warrant further investigation by testing alternative modes of intervention.

Schueller (2014) states, “Positive psychology was born in the twenty-first century and as such, has benefited from the substantial technological environment available to conduct research and advance psychological theory” (p.475). It is thus surprising that there is very little research on delivering gratitude interventions through technology-based mediums. The use of text-messages to deliver a gratitude intervention has not been investigated. Despite the relative lack of evidence on the use of text-messages to promote mental health, and critiques of technology’s use in health promotion, there are a number of reasons to suggest that delivering a gratitude intervention over text-message could be a novel, effective approach. First, the text-message approach may help overcome the demands of self-regulation that other, journal-based gratitude interventions require. Second, the text-message approach provides a way of communicating with youth that is culturally relevant, and uses an interface that they are likely to be familiar with already. Third, the approach requires minimal resources, and it would be able to be easily delivered through community groups. This would enable widespread community intervention, and help to ensure youth receive the support they need. Fourth, use of technology in health promotion (as compared to intervention) is under-researched, and the facilitation and promotion of gratitude via text-messaging is relatively straightforward. Further, the text-message medium is an electronic platform that people interact with multiple times a day. This familiarity and simplicity in the approach may help people to make expressing gratitude an everyday part of their lives, which research suggests enhances the effectiveness of gratitude interventions (Lyubomirsky et al., 2005).

Therefore, the current study has the following broad aims and research questions:

1. To investigate the effectiveness of a text-message-based gratitude intervention on youth mental health and wellbeing
 - a. What is the effect of asking gratitude-based questions each day on youth mental health and wellbeing immediately post-intervention?

- b. Are any effects of the intervention on youth mental health and wellbeing still significant at one month post-intervention?
 - c. Are there any moderating factors that could impact the effectiveness of the intervention?
- 2. To investigate the feasibility of this approach with youth aged 16-21 years
 - a. How do youth engage and interact with daily questions sent over text-message that they are asked to respond to?
 - b. What are the key considerations of delivering text-message-based interventions for health promotion?

3 Methodology

This study employed a between-group experimental method to examine the effect of receiving daily text-messages on youth mental health and wellbeing. Participants received text-messages once a day for four weeks. In the gratitude condition, questions were related to gratitude and thankfulness, while in the reflective condition questions were about everyday life. Participants were asked to reply to each of the questions, which are detailed further in section 3.4.5. In this chapter, the study's methodology is detailed, beginning with ethical considerations, then moving on to the recruitment of participants, the recruited sample's characteristics and the procedures involved in delivering the intervention and collecting data. This chapter concludes with a description of the mental health and wellbeing measures that were employed and how the data were analysed.

3.1 Ethical considerations

The study was reviewed and approved by the University of Canterbury's Human Ethics Committee (HEC 2014/39). Due to the study's sensitive nature – it communicated with young people (including some of whom could be emotionally unstable) on a daily basis for four weeks – the study had some special ethical considerations. As detailed in section 3.4.1, study participants were required to read a detailed information and consent form that covered each of the following ethical considerations in detail. Participants were also advised of who they could contact if they had any concerns or questions.

The first key ethical consideration was *confidentiality and anonymity*. The text-messaging application used in this study automatically hid participants' mobile phone numbers and assigned them with a unique participant ID number. Participants were informed of their ID number during the sign-up process, which they were asked to enter when

completing the pre-intervention, post-intervention, and follow-up questionnaires. To ensure that participants could be contacted upon completion of the text-message component of the intervention (i.e. to ask them to complete the post- and follow-up questionnaires), the study also asked for the participants' email addresses at the end of the information and consent form. Participants were informed that their email addresses would be stored next to their participant IDs, but on a separate spreadsheet to where their text-message and questionnaire responses would be stored. Participants were also informed that individual information would not be disclosed in any publications, as all results would be reported anonymously and at the group level (e.g. averages, percentages, etc.), thus assuring confidentiality and anonymity.

A second key ethical consideration was ensuring that there was a *risk management plan* in place to support any participants who expressed signs of risk in their text-messages. Unlike previous studies, the current study involved two-way interaction. The researcher was trained by a Youthline trainer to identify signs of risk in participants' text-messages. Participants were informed that, if we had concerns for their safety, they may be referred to Youthline's text and/or phone-counselling services where they would receive support from a trained counsellor. They were also informed that although the researchers could not view their mobile phone number, Youthline would be able to access this if there were serious concerns about their safety. A second element to the risk management plan included an automatic reply that was sent to any participants who sent their reply text-message outside of the study hours (i.e. between 10:00pm and 8:00am). Specifically, this text-message stated; "*Thx for ur txt. We will reply in the morning. If you require support you can ph Ythline on 0800376633. If ur in need of emergency assistance, please dial 111.*" This reply ensured that, in the unlikely event the participant had sent a text-message indicating risk or asking for help, they knew of services that they could contact. All text-messages sent outside of the study hours were reviewed the following morning. Issues were minimal during the intervention (described in section 4.2.3).

A third key ethical consideration was *protection*. All data was stored on two secure online databases (the text-application's and Qualtrics' survey software). Throughout the intervention, back-ups of these two data sets were downloaded every second day, and were saved in locked computer files. Hardcopies of the questionnaire were made available to people without computer access, and, if completed, would be stored in a locked cabinet on the University of Canterbury campus. Participants were informed of such steps, and were also informed that all data would only be accessed by the research team, and would be destroyed after five years.

3.2 Recruitment

Participants for this study were recruited during the first three weeks of August 2014 via posters (Appendix A), brochures (Appendix B), and a website (www.MindfulTXT.wordpress.com) (Appendix C). A logo was also developed (see Figure 3) to help make the study appeal to youth, and to increase the study's reputability by using it consistently across recruitment and sign up materials. The posters and brochures detailed information about the study, and how interested participants could find out more information and sign up. In addition to the information displayed on the posters and brochures, the website (Figure 3) included a more detailed information page for potential participants, along with a contact form should people have any questions about the study before signing up. The website also included a section asking community organisations and youth workers to help recruit participants for the study. This section included a contact form for recruiters to fill out to request recruitment materials.

Organisations, personal contacts, and fellow attendees at a national youth wellbeing hui were approached in person or through email to discuss the study, and to ask if they would be willing to help recruit participants. Organisations that agreed to help were supplied with a

recruitment pack that included an information sheet (Appendix D), three posters, and 30 brochures. Recruitment packs were delivered in person, posted, or sent as attachments over email (depending on the organisation's preference). The request for help in recruiting participants was also sent out to organisations and youth workers registered on the Canterbury Youth Workers Collective database, and was also advertised in Linkage's newsletter. Participating organisations included community organisations (including youth groups, YouthTown, @442Tuam/White Elephant Trust), tertiary institutions (including Avonmore Tertiary Institute, University of Canterbury, University of Otago, Christchurch Polytechnic Institute of Technology [CPIT]), health centres (including Youth 298, High Street Youth Health, VIBE Wellington, High Street Youth Health), and school student service areas (including Christchurch Boys' High School, Christchurch Girls' High School, Mount Roskill Grammar, Aranui High School).



Figure 3. Screenshot of the MindfulTXT study website's homepage.

A second component of the recruitment strategy was the use of social media. Several participating organisations shared a link to the website on their Facebook pages, along with a

small blurb explaining what the study involves and how they could sign up. Messages were also sent to Facebook groups that appeared to have a large and diverse youth audience (e.g. ‘Youthline’, ‘Be The Change’, ‘WAIYouth’). As depicted in Figure 4, using organisations that had a large following on their Facebook pages often resulted in a high number of ‘likes’ and ‘shares’ by other organisations or individuals. This approach helped to spread information about the study to community groups and potential participants both locally and nationwide.

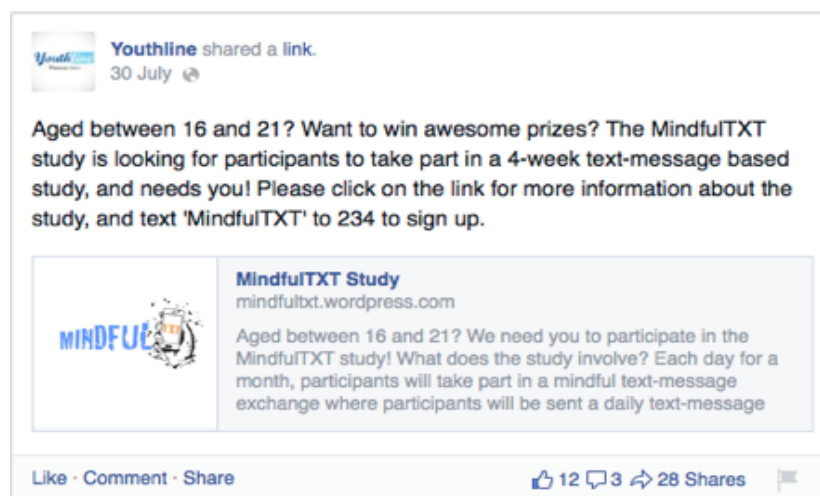


Figure 4. Example of the MindfulTXT study website being shared by Youthline on Facebook.

Table 1 reports how participants heard about the study. It is likely that people who saw it on Facebook would have also visited the website considering the website’s high number of visitors; website visitors were highest during week one of the recruitment period, and declined thereafter (week one = 217 visitors, week two = 156 visitors, week three = 48 visitors). The most popular referrers to the website (i.e. websites that displayed links that brought people to the website) included Facebook, Christchurch Girls’ High School, SubjectsWanted, Linkage, and the Cystic Fibrosis Association of New Zealand, thus demonstrating the efficacy of displaying the website on both social media and on organisation’s websites.

Table 1*How participants heard about the study.*

Variable	%(Frequency)
Brochure	2.2%(3)
Poster	12.5%(17)
Somebody told you about it	25%(34)
Facebook post	47.1%(64)
MindfulTXT Website	1.5%(2)
School	4.41%(6)
Subjects Wanted Website	2.94%(4)
Other	4.41%(6)

3.3 Participants

Participants ($n = 136$) were older adolescents and young adults recruited throughout New Zealand (see Table 2 below). The majority of participants lived in Christchurch (82, 60.29%) while 18 (13.24%) lived in Auckland, 14 (10.29%) lived in Wellington, and 22 (16.18%) lived in other areas of New Zealand. The age range was 16–21 years ($M = 18.09$ years, $SD = 1.7$) and included 116 (85.29%) female participants and 20 (14.71%) male participants. Notably, compared to the gratitude condition, the proportion of participants in the reflective condition appeared to decline with age. The vast majority of participants identified themselves as New Zealand European (114, 83.82%), while 15 (11.03%) identified themselves as Māori, 17 (12.5%) as Indian/Asian, 8 (5.88%) as Pasifika, and 8 (5.88%) as other ethnicities (n.b. some participants identified themselves with more than one ethnicity, hence figures do not add up to 100%). The majority of participants were engaged in either education and/or work, with 52 (38.24%) participants identifying themselves as a secondary school student, and 59 (43.38%) as a tertiary student. Over one-third of participants were

working part-time ($n = 53, 38.97\%$), while just four (2.94%) indicated that they were working full-time. A small number of participants ($n = 13, 9.56\%$) indicated that they were not studying or working. A moderate number of participants (36.76%) specified that they had a faith/religious orientation, including 21 (15.44%) who identified as Christian, three (2.21%) as Catholic, four (2.94%) as Anglican, one (0.74%) as Te Hāhi Rātana, and 21 (15.44%) as other faiths/religious orientations. As shown in Table 2, the demographic profiles were similar between experimental conditions. Chi squared tests showed no significant differences in demographics between the two conditions.

To assess the socioeconomic status of the sample, participants reported on the educational qualifications and occupational status of their parent/s. Overall, participants in the two intervention groups were very similar (see Table 2), and appeared to be of relatively high socioeconomic status. In terms of education, participants indicated that their mother's highest education level was either a secondary school qualification ($n = 46, 33.82\%$), a tertiary qualification ($n = 52, 38.24\%$), or a post-graduate qualification ($n = 18, 13.24\%$), while 20 (14.71%) were either unsure, or did not live with their mother. Participants indicated that their father's highest education level was either a secondary school qualification ($n = 24, 17.65\%$), a tertiary qualification ($n = 55, 40.44\%$), or a post-graduate qualification ($n = 21, 15.44\%$), while 36 (26.47%) were either unsure, or did not live with their father. In terms of occupation, participants indicated that their mother's occupation was in one of the following areas; Professional/Managerial ($n = 27, 39.7\%$); Technical/Trade ($n = 27, 19.85\%$); Unskilled ($n = 31, 22.79\%$); Unemployed ($n = 6, 4.41\%$). Eighteen participants (13.24%) did not know what their mother's occupation was, or did not live with their mother. Participants indicated that their father's occupation was in one of the following areas; Professional/Managerial ($n = 46, 33.82\%$); Technical/Trade ($n = 24, 35.3\%$); Unskilled ($n = 8, 11.8\%$); Unemployed ($n = 8, 5.88\%$). Twenty-three (16.91%) did not know what their father's occupation was, or did not live with their father.

Table 2*Demographic background of participants (n=136, 68 each group)¹.*

Variable	Reflective Mean (SD) or % (Frequency)	Gratitude Mean (SD) or % (Frequency)
Gender		
Female	83.8%(57)	86.8%(59)
Male	16.2%(11)	13.2%(9)
Age (years)	17.9(1.73)	18.28(1.67)
16 years	27.9%(19)	20.6%(14)
17 years	23.5%(16)	16.2%(11)
18 years	13.2%(9)	16.2%(11)
19 years	13.2%(9)	19.1%(13)
20 years	10.3%(7)	17.6%(12)
21 years	11.8%(8)	10.3%(7)
Ethnicity		
NZ European	83.82%(57)	83.82%(57)
NZ Māori	10.29%(7)	11.8%(8)
Pasifika	7.35%(5)	4.41%(3)
Indian/Asian	19.12%(13)	5.88%(4)
Other	4.41%(3)	7.35%(5)
Education/Occupation		
Secondary school student	47.1%(32)	29.4%(20)
Tertiary education student	38.2%(26)	48.5%(33)
Working part-time	32.4%(22)	33.8%(23)
Working full-time	2.9%(2)	2.9%(2)
No Education/Work	8.8%(6)	10.3%(7)
Faith/Religious Orientation		
Catholic	0%	4.4%(3)
Christian	17.7%(12)	14.7%(10)

¹ n.b. percentages in some categories do not add up to 100 as multiple responses are possible

Variable	Reflective Mean (SD) or % (Frequency)	Gratitude Mean (SD) or % (Frequency)
Anglican	0%	5.9%(4)
Te Hāhi Rātana	0%	1.5%(1)
Other	10.3%(7)	19.1%(13)
No faith/religious orientation	72.1%(49)	54.4%(37)
Mother's Highest Education Level		
Secondary School Qualification	35.3%(24)	32.4%(22)
Tertiary Qualification	29.4%(20)	47.0%(32)
Post-Graduate Qualification	17.7%(12)	8.8%(6)
Unknown	17.7%(12)	11.8%(8)
Mother's occupation		
Professional/Managerial	39.7%(27)	39.7%(27)
Technical/Trade	19.1%(13)	20.6%(14)
Unskilled	17.6%(12)	27.9%(19)
Unemployed	4.4%(3)	4.4%(3)
Unknown	19.1%(13)	7.4%(5)
Father's Highest Education Level		
Secondary School Qualification	16.2%(11)	19.1%(13)
Tertiary Qualification	35.3%(24)	45.6%(31)
Post-Graduate Qualification	16.2%(11)	14.7%(10)
Unknown	32.4%(22)	20.6%(14)
Father's occupation		
Professional/Managerial	27.9%(19)	39.7%(27)
Technical/Trade	35.3%(24)	35.3%(24)
Unskilled	11.8%(8)	4.4%(3)
Unemployed	2.9%(2)	8.8%(6)
Unknown	22.1%(15)	11.8%(8)

3.4 Procedure

The following outlines the study's procedure, including the sign up process, the delivery of the daily text-messages, and the completion of the post-intervention and one-month follow-up questionnaires. All elements of the study's procedure were pilot-tested with 10 individuals. Changes to the study's procedure as a result of pilot-testing are described where necessary.

3.4.1 Sign up

People who were interested in participating in the study were asked to text 'MindfulTXT' to 234, to which they received a reply thanking them for their interest in the study, a link to the online information and consent form (www.tinyurl.com/MindfulTXT), and a unique participant ID. Participants were advised to access the link on a computer, which was made short and clear to make it easier for participants to copy it into a web browser. An example of the sign up process is illustrated in Figure 5. Upon opening the link, participants were asked to read a detailed information and consent form (Appendix D). The information sheet outlined the process of participation and the types of information requested for the study's measures. To consent to participating in the study, participants were asked to demonstrate their understanding of the provided information by ticking checkboxes next to nine statements. Participants were then asked to enter their participant ID and email address, and were advised that their email address would be kept separate from any data relating to the text-message and questionnaire responses they provide.

Participant error in the sign up, consent and questionnaire was minimal, with all IDs being entered correctly, and only one email address entered incorrectly. Participants were sent their ID over text-message and email before each questionnaire, and were able to request their ID if they needed it. These are likely to have minimised participant error. During pilot-testing,

it was found that if the keyword, 'MindfulTXT' was spelt wrong, sign-up text-messages went to the normal Youthline counselling queue. It was possible to permanently route participants to the study queue however by selecting a button next to their initial sign-up text-message. In case any text-messages did go to the main counselling queue by mistake, all participant IDs were edited to include 'MindfulTXT' at the start (i.e. from 42935 to MindfulTXT 42935), followed by the following client note; "This client is part of the MindfulTXT study. Please forward any texts from this client on to the MindfulTXT queue – Thanks!"

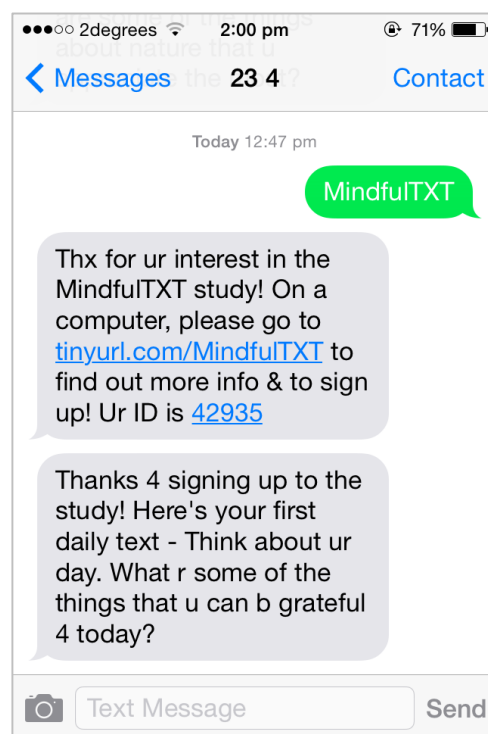


Figure 5. Screenshot of phone showing a sign up and first daily question (received after completing pre-questionnaire)

3.4.2 Pre-intervention questionnaire

Upon consenting to the study, participants were directly routed to the pre-intervention questionnaire. The pre-intervention questionnaire asked questions regarding demographics, preferred time of day to receive the text-messages, and key measures of mental health and wellbeing. Participants were given the option of what time they would like to receive their

daily text-message in an effort to help increase their likelihood of replying by sending the text-messages at a time that suited them. Pilot-test participants were asked to choose a specific time that they wanted to receive the text (i.e. 8am, 10am, midday, 4pm, or 7pm). As the text-messages were sent out manually, it became a demanding task to send the text-messages out at each of these specific times. Thus, to allow more flexibility in when the text-messages could be sent, study participants were asked if they would like to receive their daily text-message in either the morning, afternoon, or evening.

3.4.3 Condition assignment

After providing their consent and completing the pre-intervention questionnaire, participants were assigned to one of two conditions in sequential order – a gratitude condition and the reflection condition. Participants were not blinded to study conditions. For a period of four weeks (28 days), participants in both conditions were sent a daily question via text-message that they were asked to reply to. In the gratitude condition, participants responded to questions about gratitude and thankfulness. In the reflective condition, participants responded to questions about everyday life. All questions are detailed in section 3.4.5.

3.4.4 Text-application

To send text-messages, the study used an internet-based text-message application. The use of this text-application was kindly donated by Youthline. Key advantageous features of the text-application to participants included that it was entirely free and anonymous. Anonymity of text-messages was assured as the system automatically hid mobile phone numbers and replaced each of them with a unique 5-digit ID. This ID was also used to match text-message and questionnaire responses. Other advantageous features of the text-application to this study were that it stored the chat history of each participant, making it easier to monitor participants' replies. The text-application also stored common text-message replies that could be selected from a drop-down list, in addition to the automatic reply that was sent

to participants who texted the system outside the study hours (i.e. 10pm to 8am). Finally, the text-application had a text-report function, which enabled data collection of all sent and received text-messages that could then be transferred into Microsoft Excel and SPSS. Examples of the text-application are illustrated in Figure 6 and Figure 7.

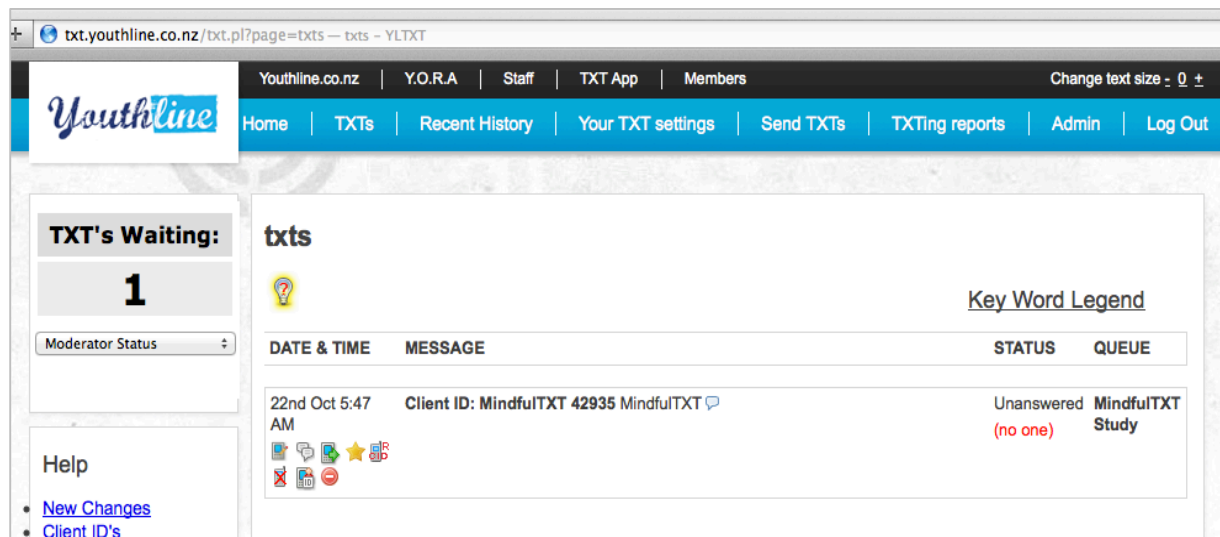


Figure 6. Screenshot of text-application homepage, showing one unanswered incoming text-message.

Pilot-testing identified an issue with the text-application that had the potential to disrupt the delivery of the intervention, however the text-application developer and Youthline staff assisted in finding solutions for this. The issue was that sending a text-message to someone required finding the participant's last incoming text-message. Thus, it appeared that it was not possible to send text-messages to people who had not replied for at least three days, after which time incoming text-messages were erased from the text-application's recent history. As a solution to this issue, the researcher was informed of a mass text-function that allowed outgoing text-messages to be sent without looking up the participant's last incoming text-message.

Client Notes: MindfulTXT (G - AM). This client is part of the MindfulTXT study. Please forward any texts from this client to the MindfulTXT queue. Thank you! [edit](#)

HISTORY

DATE & TIME	MESSAGE	STATUS	QUEUE
22nd Oct 5:47 AM	Client ID: MindfulTXT 42935 MindfulTXT	Being Answered By emilyarps (no one)	MindfulTXT Study

1 TXT's Returned

Received on: 22nd Oct at: 5:47 AM
You are replying as user: Emilyarps
Message:
 MindfulTXT

Thx for ur interest in the MindfulTXT study! On a computer, please go to tinyurl.com/MindfulTXT to find out more info & to sign up! Ur ID is 42935

14 remaining

Insert:

Primary Issue: (last: Gratitude Condition 16/09)
 Secondary Issue:
 Tertiary Issue:

send
Cancel
Incident Report

Figure 7. Screenshot of text-application with open client file, showing a text-message being replied to.

As participants signed up to the study on different days, outgoing text-messages varied each day between participants (even between those in the same condition). To help monitor what text-messages needed to be sent to which participants, all text-message questions were stored in a spreadsheet arranged by participant ID (row) and date (column). As the text-application is designed for text-message-based counselling and is thus not capable of sending automatic text-messages, each day the text-messages were filtered by date and preferred time (i.e. morning, afternoon, and evening), and then copied and pasted into the text-application to send to participants. In addition to text-messages, the monitoring spreadsheet indicated when participants were due to complete the post-intervention and follow-up questionnaires, and also included a notes column where any concerns about participants and/or intervention

delivery issues were logged. These are described in section 4.2.3. As described further on in this section, common replies were also sent to participants as a receipt of their text-message. While time consuming, this process did have the benefit of enabling the monitoring of participants' replies and change a common reply where necessary (for example, when the risk management plan outlined in section 3.1 was actioned).

3.4.5 Text-messages

Daily text-message questions

Twenty-eight text-messages were written for each of the conditions. In the gratitude condition, participants were asked to respond to questions about gratitude and thankfulness. As opposed to previous interventions that asked participants what they are thankful for each day, this intervention used guided questions to prompt participants to reflect on a specific gratitude category each day (e.g. relationships, personal strengths). It was envisaged that the guided questions would encourage engagement and also help to minimise the risk of a repetitive response bias that has been found in previous interventions, which could reduce cognitive engagement and in-depth reflection. In the reflective condition, participants were asked to respond to questions about everyday life. Like the gratitude condition, questions were guided in an effort to maintain engagement throughout the study.

An initial set of questions for each condition were pilot tested with 10 people aged 16-24 years (n.b. these pilot-testers were not the same as the ones who pilot-tested the intervention's delivery). Pilot-testers were asked about how interesting they found each of the questions, if the questions were clear, and if they had any other interests that they wanted to be asked about that could be embedded into the questions. In an effort to ensure that the text-messages were engaging for study participants, questions that were rated as 'not interesting' by three or more pilot-testers were removed. Pilot-testers preferred questions that were more specific (e.g. asking about favourite hobbies) than broader ones (e.g. asking about their day).

Questions in both conditions were refined significantly following the initial pilot-testing. Simple, easy to understand text-speak was also introduced to the questions, which has been used to increase rapport with young people using text-message counselling services (Haxell, 2014). Following further pilot-testing with the users who pilot-tested the intervention itself, pilot-testers rated fewer questions as non-interesting. However, some text-speak words were removed as pilot-testers reported that they were difficult to understand (e.g. “4get” meaning “forget”, and “some1” meaning “someone”). Pilot-testing also highlighted the need to ensure that no text-messages exceeded 160 characters in length, as participants with certain phone models would receive the text-messages in more than one message. Pilot-testing also picked up on where symbols were not recognisable by the text-application, including an ‘@’ sign. Any such symbols were removed from the questions. The final questions that were developed and used in the intervention are detailed in Table 3.

Table 3

Text-message questions that were sent to participants in the Gratitude and Reflective Conditions

	Gratitude text-message questions	Reflective text-message questions
1	Thanks 4 signing up to the study! Here's your first daily text - Think about ur day. What r some of the things that u can b grateful 4 today?	Thanks 4 signing up to the study! Here's your first daily text - If u were invited to a costume party, who/what would u go as?
2	What talent/strength do u have that u r thankful 4?	What advice would u give a younger sibling/child about life?
3	Think about the possessions u have. What is it about these that u r thankful 4?	What do u and ur friends do 4 fun?
4	Think about some of the people in ur life. Who has benefited ur life, and how can u be thankful 2 them?	If u could learn a new skill, what would it b?
5	Think about ur favourite memories. What/who r u thankful 2 for making these memories a favourite?	If u could join the circus, what act/performance would u like to b in?

	Gratitude text-message questions	Reflective text-message questions
6	Think about the country we live in. What's something that Kiwis can be thankful 4?	What one quality do u look for the most in a friend?
7	Think about ur past week. What r some of the things that u can be thankful 4?	How do u like to spend a rainy day?
8	Think about a stressful time in ur life. Who are u thankful 2 for helping u through that time?	What would u do if u had a magic wand?
9	Think about an important lesson that u learnt in the last year. Who are u thankful to for teaching u this lesson?	If u had to enter a talent show, what talent would u show off?
10	Think about the best teacher that u have ever had. What is something that u can be thankful 2 them 4?	What are some of ur hobbies?
11	Think about the things that make u feel happy. What r some of these?	What's the last movie that u really enjoyed?
12	Think about the best place you've been 2. What was it about the place, or the people u were with, that made it so great?	If u could turn into an animal, what sort of animal would you be and where would u live?
13	Think about ur neighbourhood. What r some of the things about ur neighbourhood that u r thankful 4?	What's ur favourite pizza topping?
14	Think about ur day. What r some of the things that u can be grateful 4 today?	What r u looking 4wd to the most about the next 5 years?
15	Think about how u are feeling 2day (how ur body and/or mind feels). What feelings do u have that u r thankful 4?	If u had to move and could only take 3 items with u, what would u take?
16	Think about some of the things in ur life that u think u may be taking 4 granted. What's 1 thing that you're taking for granted that you're thankful 4?	What TV programmes do u like watching?
17	Think about the opportunities that u have had in the last year or 2. What/who are u thankful 2 for giving u these opportunities?	If u could live the life of 1 famous person, who would this be?
18	Think about the things you like 2 do in ur spare time. What is it about these things that u enjoy?	What's ur favourite kind of food?
19	What's something u consider 2 be beautiful? What can u be thankful 4 about this experience?	What's another culture that u would like 2 find out more about? Y?

	Gratitude text-message questions	Reflective text-message questions
20	Think about some of the challenges in ur life. Looking back, what is it about these challenges that u can b thankful 4?	What musical instrument would u like to learn 2 play?
21	Think about some of the things that u are thankful 4. Out of these things, what is the smallest thing that u r thankful 4?	What's ur dream job?
22	Think about the important people in ur life. Choose 1 of these people, & let us know what it is about this person that u are thankful 4.	What's the best restaurant you've ever been 2?
23	What's the best advice you've ever received that you're thankful 4? How has this advice influenced ur life?	How would u describe urself to some1 who doesn't know u?
24	Think about the natural environment. What are some of the things about nature that u appreciate the most?	What country do u really want 2 visit?
25	Think about ur biggest achievement over the past few years. What/who are u thankful 2 4 helping u 2 achieve this?	What do u find is the best way 2 relax?
26	Think about some of the things you've learnt about urself in the past year. What have u learnt about urself that u can b grateful for?	If u could have lunch with 1 famous person, who would it b? Y?
27	What qualities do ur friends/whānau have that u are thankful 4?	What is/was ur favourite subject at school? Y?
28	Here's ur last daily question! Think about the things that you're thankful for. What r the top 3 things that u are thankful for?	Here's ur last daily question! What's 1 thing u miss about being a kid?

Common replies

Over the course of the intervention, participants received one of nine common replies that corresponded to each of the daily text-messages (Table 4) and an example of the text-message interaction is demonstrated in Figure 8. These common replies were designed to help maintain engagement in the study, and were the same in both conditions. Any text-messages received outside of the study hours received the earlier identified

automatic reply. If a participant did not reply to the daily questions for three days, they received another text-message reminding them to reply to the questions. While this was important to the study and seemed to facilitate an active engagement with the intervention, it is acknowledged that the reminder text-messages may have resulted in forced responses.

Table 4

Common replies sent to participants

Day(s)	Common Reply
At sign up	Thx for ur interest in the MindfulTXT study! On a computer, please go to tinyurl.com/MindfulTXT to find out more info & to sign up! Ur ID is
1	Thx 4 ur reply! We will send u a txt each day letting u knw that we got ur txt, but plz note this may take a few hours :)
2, 5, 8, 9, 12, 15, 16, 19, 22, 23, 26	Thx 4 ur reply!
3, 10, 17, 24	Thx 4 ur reply, we really appreciate ur time participating in this study!
4, 11, 18, 25	Thx 4 ur reply, don't forget about the prizes we have to thank you for participating in this study!
6, 13, 20, 27	Thx 4 ur reply, we hope you're enjoying participating in this study!
7	Thx 4 ur reply - 1 week down, 3 to go!
14	Thx 4 ur reply, you're now halfway through the study!
21	Thx 4 ur reply, just 1 more week to go!
28	Thx 4 ur reply to the final question! Plz go to tinyurl.com/MindfulTXT1 to complete a short questionnaire. This is really important to our study, thx! ID -----
28 (if no reply)	2day's question was the last one! Plz go to tinyurl.com/MindfulTXT1 to complete a short questionnaire. This is really important to our study, thx! ID -----

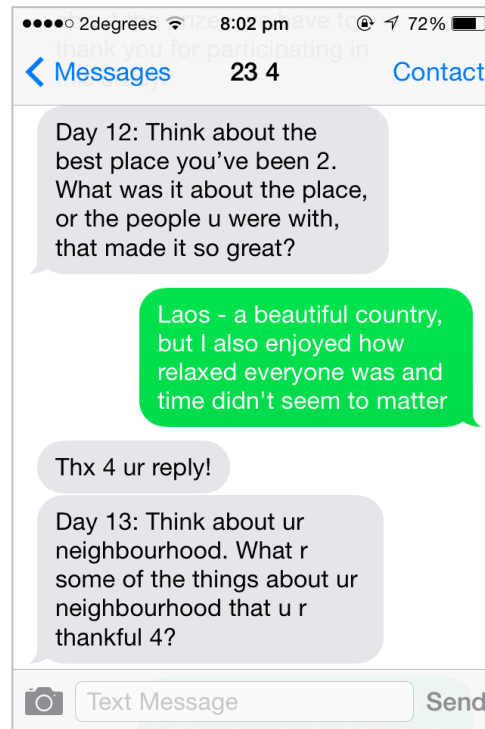


Figure 8. Phone screenshot showing example questions, a participant reply, and a common reply (gratitude condition).

3.4.6 Post- and follow-up questionnaires

On day 28 of the intervention, participants were sent a link to the post-intervention questionnaire via both text-message and email. At the one-month follow-up, participants were again sent a link to the follow-up questionnaire over both text-message and email. Daily reminder text-messages and emails were sent for up to three days following the first reminder to those who were yet to complete the questionnaires. Both the post-intervention and follow-up questionnaires measured the same key mental health and wellbeing variables as the pre-intervention questionnaire, in addition to questions about participants' experiences with the intervention (described in section 4.3). Mindfulness was also measured in the follow-up questionnaire. On the last day of the intervention (day 28), participants received a link to the immediate post-intervention questionnaire via text-message. This link was also sent over email to try and encourage people to complete the

questionnaire the next time they were on a computer. Finally, four weeks after the intervention, participants were sent another link via text-message and email to the final follow-up questionnaire. If participants did not complete each of the questionnaires within 24 hours of being notified, they were sent reminder text-messages and emails for up to three days after the first reminder. Only one ID was entered incorrectly in the post-intervention questionnaire, however as it was only one-digit out and as the participant was one of the first to receive the link to the questionnaire, it was easy to work out what ID it was supposed to be. Notably, the one participant who entered their email address incorrectly on the consent form completed all three of the questionnaires as they were able to receive the link over text-message.

3.5 Measures

In order not to burden participants with lengthy questionnaires that could increase the likelihood of haphazard responding (Lucas et al., 2003), all measures were as brief as possible. All measures were chosen in consideration of criteria listed by Richardson, McCauley, et al. (2010) as ideal for screening instruments, including being brief, easily understood by participants, available without cost, in addition to having strong performance characteristics. Notably, some scales were adjusted to make the scales consistent and easier for participants to complete. Some items were also dropped due to item overlap across measures. The following measures were assessed pre-intervention, post-intervention, and at the one-month follow-up. For each assessment, individual items of each measure were averaged together to create the composite measure for that variable. At pre-intervention, the only significant difference between the two-conditions was in self-esteem (see Table 5 below).

3.5.1 Gratitude

Participants' dispositions towards experiencing gratitude were measured using the Gratitude Questionnaire-Six Item Form (GQ-6) (McCullough et al., 2002) (Appendix E). The GQ-6 was developed by McCullough et al. (2002) to capture the elements of gratitude that they conceptualised (intensity, frequency, density, and span), and has been used extensively in gratitude research. The questionnaire includes six statements that capture gratitude (e.g. "I am grateful to a wide variety of people"), and requires participants to rate their level of agreement with each statement on a seven-point Likert scale ('strongly disagree' to 'strongly agree'). Evidence shows that the GQ-6 is positively related to optimism, hope, forgiveness, spirituality and religiousness, empathy, life satisfaction and pro-social behaviour, while negatively related to envy, anxiety, depression, and materialism (McCullough et al., 2002).

In adult samples, GQ-6 scores have demonstrated high internal consistency (Cronbach alphas between .82 and .87), and a robust one-factor structure (McCullough et al., 2002). Among adolescents (aged 10-19 years), Froh, Fan, et al. (2011) found that the GQ-6 measure had acceptable internal consistency ($>.70$), and, in comparison to two other gratitude measures (GRAT-short form and GAC), had the strongest correlation with negative affect. As recommended by Froh, Fan, et al. (2011), item six ("Long amounts of time can go by before I feel grateful to something or someone") was excluded in the study's questionnaires due to its low factor loading and apparent abstractness making it difficult to understand for youth. Further, as Froh, Fan, et al. (2011) recommended, the word 'grateful' was replaced with 'thankful', as the latter is reportedly used more often among youth when describing their experiences as a beneficiary. The five items used from the GQ-6 showed strong internal consistency reliability at each measurement (Cronbach alphas ranged from .80 to .86).

3.5.2 *Life Satisfaction*

Satisfaction with life is considered to be an important component of wellbeing (Gilman & Huebner, 2000). General life satisfaction was measured using the Satisfaction with Life Scale (SWLS) (Diener et al., 1985) (Appendix F). The SWLS measures includes five statements (e.g. “The conditions of my life are excellent”) and requires participants to rate their level of agreement with each statement on a seven point Likert scale (‘strongly disagree’ to ‘strongly agree’). Each item is added to produce an overall score of total life satisfaction. Diener et al. (1985) found the scale to have good validity and reliability with undergraduate students. In a systematic review of tools used to measure life satisfaction among adolescents, Gilman and Huebner (2000) found acceptable internal consistency (ranging from .67 to .78) with adolescents from varying cultures (i.e. Chinese, Portuguese). The scale also has good construct validity, with moderate to strong correlations with self-efficacy, psychological maturity, and happiness ($r = .40, .61$, and $.71$ respectively), in addition to significant, negative correlations with loneliness ($-.49$), shyness ($-.29$), and social anxiety ($-.23$) (Neto, 1993). The five items on the SWLS scale showed strong internal consistency reliability at each measurement (all Cronbach alphas were .90).

3.5.3 *WHO-5 Wellbeing Index*

Wellbeing was also measured using the WHO-5 Wellbeing Index (WHO, 1998). The measure includes five positively phrased items related to vitality, positive mood, and general interest (Appendix G). Scores range from 0-25. Although initially designed for use with adults, the measure has been used with youth frequently, including in New Zealand (e.g. (Canterbury Earthquake Recovery Authority, 2013; Fleming et al., 2014). In one study, de Wit, Pouwer, Gemke, Delemarre-van de Waal, and Snoek (2007) investigated the validity of the measure with adolescents with diabetes, and found that the study had high internal

consistency ($r = 0.82$), and good concurrent validity when correlated with other scales measuring mental health and self-esteem. The five items on the WHO-5 scale showed strong internal consistency reliability at each measurement (Cronbach alphas ranged from .89 to .91).

3.5.4 Self-Esteem

The Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965) was used to measure self-esteem (Appendix H). The scale is constructed of five positively and five negatively phrased items about the self, and are composed in the first person (e.g. ‘at times I think I am no good at all’; ‘I wish I could have more respect for myself’). Respondents are required to respond to each of items on a four point Likert scale (‘strongly agree’ to ‘strongly disagree’). The scale is one of the most widely used measures to measure global self-esteem among adolescents and is the shortest (Butler & Gasson, 2005). Among youth (aged 12-19 years), Bagley and Mallick (2001) found that the use of the RSE scale had good internal consistency (Cronbach alphas ranged from .81 to .88). They also found that it has good construct validity; across both male and female and all age groups, good self-esteem was negatively correlated with somatic problems (correlations ranged from -.25 to -.48) and emotional disorders (i.e. depression, anxiety, suicidal thoughts) (correlations ranged from -.42 to -.66). Good self-esteem was also negatively correlated with hyperactivity and conduct disorder in both males and females 12-17 years, and males 18-19 years (hyperactivity correlations ranged from -.17 to -.44; conduct disorder correlations ranged from -.14 to -.41) (Note, correlations of 0.20 and above were significant at 5% and beyond). Notably, hyperactivity and conduct disorder did not correlate with the RSES among female students aged 18-19 years. The 10 items on the Rosenberg Self-Esteem scale showed strong internal consistency reliability at each measurement (Cronbach alphas ranged from .92 to .93).

3.5.5 Depression

Depression was measured using the Patient Health Questionnaire-nine (PHQ-9) measure, a nine-item measure used to detect and assess the severity of depression (based on the DSM IV diagnosis) (Kroenke, Spitzer & Williams, 2001) (Appendix I). The measure includes nine problems (e.g. “Little interest or pleasure in doing things”), and requires participants to rate each of the problems on a four-point scale, ranging from 0 (‘not at all’) to 3 (‘nearly every day’). Scores are interpreted as follows: minimal (1-4), mild (5-9), moderate (10-14), moderately severe (15-19), and severe (20-27).

In comparison to other, longer measures of depression, the measure has been shown to have good diagnostic validity and comparable sensitivity and specificity (Kroenke et al., 2001; Wittkamp, Naeije, Schene, Huyser, & van Weert, 2007). While support exists for several other self-report measures used to screen for depression among adolescents (e.g. the Beck Depression Inventory, the Reynolds Adolescent Depression Scale (revised)) (Young et al., 2013), literature tends to favour the PHQ-9 measure for its shorter length, being easily understood by participants, and being able to administer and score easily (Khamseh et al., 2011; Milette, Hudson, Baron, Thombs, & Canadian Scleroderma Research, 2010; Richardson, McCauley, et al., 2010).

Among adults, the scale has been found to have strong internal consistency (Cronbach alphas ranging from .86 to .89), and a test–retest correlation after 48 hours of $r = .84$ (Kroenke et al., 2001). Widely used with adults, Richardson et al. (2010) examined the performance characteristics and validity of the Patient Health Questionnaire-9 Item (PHQ-9) as a screening tool for depression among adolescents. While 10 or higher is recommended to identify adults with depression, Richardson et al. (2010) recommended a score of 11 as the lowest cut-off point for identifying adolescents with depression, as they found that a score of 11 or more had

higher sensitivity (89.5%) and specificity (77.5%) for detecting youth who met the criteria for major depression on the (based on The Diagnostic Interview Scale for Children [DISC-IV]). Such sensitivities and specificities are comparable to those found in adult populations (Kroenke et al., 2001). Lastly, in a systematic review, Kroenke (2010) found that the PHQ-9 measure performs similarly across age, sex, and ethnic groups, and also performs similarly regardless of mode of administration, including patient self-report, interviewer-administered, and touch-screen computer administrated. The nine items on the PHQ-9 scale showed strong internal consistency reliability at each measurement (Cronbach alphas ranged from .90 to .92). Using the scale's cut off scores at the pre-intervention assessment, 34 (25%) participants had minimal depression, 39 (28.7%) had mild depression, 25 (18.4%) had moderate depression, 22 (16.2%) had moderately severe depression and 16 (11.8%) had severe depression.

3.5.6 Anxiety

The Brief Generalized Anxiety Disorder Scale (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006) was used to measure anxiety in this study (Appendix J). The scale requires participants to rate how often they have been bothered by seven problems including “Not being able to stop or control worrying”. Participants respond on a four-point Likert scale (0 “never,” 1 “several days,” 2 “more than half the days,” and 3 “nearly every day”). The scale has high internal consistency ($\alpha = .92$), good test-retest reliability ($r = .83$) and convergent validity with other anxiety scales, including the Beck Anxiety Inventory ($r = .72$) and the anxiety subscale of the Symptom Checklist-90 ($r = 0.74$) (Spitzer et al., 2006). In a systematic review of somatic, anxiety and depression scales used in the Patient Health Questionnaire, Factor analysis that included the GAD-7 items showed that all anxiety items had the highest factor loadings on the second factor (0.69-0.81) (Kroenke, 2010). Scores are interpreted as follows; normal (0-4), mild (5-9), moderate (10-14), and severe (15-21). This measure was chosen for its brief nature and, while there is no evidence demonstrating its

effectiveness in a youth population, it has been validated in 2740 primary care patients (mean age = 47.4, SD = 15.5) (Spitzer et al., 2006). The seven items on the GAD-7 scale showed strong internal consistency reliability at each measurement (Cronbach alphas ranged from .90 to .94). Using the scale's cut off scores at the pre-intervention assessment, 52(38.2%) participants were 'normal', while 36(26.5%) had mild anxiety, 26(19.1%) had moderate, and 22(16.2%) had severe anxiety.

3.5.7 Mindfulness

Mindfulness was measured in the final, 4-week follow up questionnaire using the Mindful Attention Awareness Scale (Brown & Ryan, 2003). This measure was added when it was decided, after the pre- and post-intervention assessments, that it would be a valuable outcome variable to assess, especially to the field of gratitude literature. The measure consists of 15 statements related to emotional, cognitive, physical, interpersonal, and general domains that focus on things on the present (rather than specific attributes that have been associated with mindfulness, such as empathy and trust) (Appendix K). The measure was found to have high internal consistency with college students (Cronbach alpha = .82) (Brown & Ryan, 2003). Item 12 ("I drive places on 'automatic pilot' and then wonder why I went there") was asked in the follow-up questionnaire, but was later removed from analysis due to its likely inappropriateness with younger participants in the sample. The 14 items of the Mindfulness Attention Awareness Scale that were used for analysis showed strong internal consistency reliability when measured at follow-up (Cronbach alpha = .92). As this measure was only assessed at follow-up, it is not known if there were any differences in mindfulness from the conditions at pre-intervention.

3.6 Analytic Strategy

The text-messaging software captured the complete record of each text question and all participants' replies. The required sample size for 80% power ($p = < .05$) was 65. Data collection for the measures reported above took place through online questionnaires (hosted by Qualtrics). All data from the pre-intervention, post-intervention, and follow-up questionnaires were analysed with IBM SPSS (Version 21). An alpha level of .05 was used to evaluate all statistical tests. Statistical tests included three different types of mean comparisons, examining group differences between the gratitude and reflective intervention groups as well as change over time. A multivariate analysis of variance (MANOVA) was employed to look for mean differences between the two groups at pre-test. Analyses of covariance were used to examine mean differences across the two intervention conditions for each post-intervention outcome, with the corresponding pre-intervention measure entered as a covariate. As ANCOVAs do not examine changes over time, repeated measures ANOVAs were employed to look at the intervention's main effect over time across both groups simultaneously, and to test possible interactions by time and condition. For analyses examining mean group differences, Cohen's d was used as an estimate of effect size. Repeated measures ANOVAs have several shortcomings too (further described in section 4.1.3), and thus I consulted with two experts to complete growth-curve analyses that overcome these shortcomings.

Text-messages were also analysed by analysing the character length of text-messages (averages per group, and per participant) and the number of times participants replied late (i.e. after 24 hours), or did not reply at all. To analyse participant subjective evaluations of the intervention, an inductive analysis approach was employed (Thomas, 2006). This approach is often employed when little is known about a topic (Thomas, 2006), and thus makes it suitable for analysing subjective evaluations. In line with the coding process of this approach, all

participants' evaluation responses were copied into a Microsoft Excel spread-sheet. The researcher then read through the responses to each of the questions in depth to identify themes. Once familiar with the content of participants' responses, the researcher defined categorical themes and codes for each question. Each response was then coded, and more than one code was used where more than one category was identified in a participant's response. All coding was reviewed three times to ensure that themes were correctly identified and coded.

4 Results

A total of 136 participants signed up for the study, with just five pulling out of the study during the intervention period. There were no significant differences between those who did not complete the post-intervention and/or follow-up questionnaires and those who remained in the study on any of the wellbeing or mental health variables assessed. The first part of this chapter relates to the study's first aim and outlines the effect of the gratitude intervention on the six outcome mental health and wellbeing variables. The second part of this chapter focuses on results relevant to the study's second aim, the feasibility of the approach with youth. The delivery of the intervention (including text-message responses, engagement, and intervention issues) is analysed, followed by participants' subjective evaluations of the intervention.

4.1 Impact of receiving daily text-messages on youth mental health and wellbeing variables

4.1.1 Pre-Intervention

As shown in Table 5, MANOVA tests of group differences across the six mental health and wellbeing variables at pre-intervention showed few significant group differences on any of the variables. *Gratitude*, measured on a seven-point scale, was relatively high in both conditions. Participants in both conditions rated their *life satisfaction* and *self-esteem* to be around the mid-point of the seven-point scale, however participants in the gratitude condition had significantly higher levels of self-esteem than those in the reflective condition ($p=.02$). On average, participants reported experiencing items related to *wellbeing* 'more than half of the time'. The mean scores for *depression* and *anxiety* for the two conditions were both around the mid-point of the four- and five-point scales. The distribution of cut off scores for

depression was similar across the two conditions (Reflective: 17(25%) = minimal, 21(30.9%) = mild, 12(17.6%) = moderate, 9(13.2%) = moderately severe, 9(13.2%) = severe; Gratitude: 17(25%) = minimal, 18(26.5%) = mild, 13(19.1%) = moderate, 13(19.1%) = moderately severe, and 7(10.3%) = severe). The distribution of cut off scores for anxiety was also similar across the two conditions (Reflective: 26(38.2%) = normal, 19(27.9%) = mild, 12(17.6%) = moderate, 11(16.2%) = severe; Gratitude: 26(38.2%) = normal, 17(25%) = mild, 14(20.6%) = moderate, and 11(16.2%) = severe). All variables were modestly distributed, around one standard deviation. At pre-intervention, anxiety and depression were both positively skewed, while gratitude was negatively skewed. Significantly skewed variables were transformed and re-analysed; however, there were no substantive changes to the results.

Table 5

Mean differences (MANOVA) across groups at pre-test (N=136, 68 each group).

Variable	Gratitude <i>m</i> (<i>SD</i>)	Reflective <i>m</i> (<i>SD</i>)	<i>F</i>	<i>P</i>
Gratitude	5.79(1.00)	5.53(1.00)	2.19	0.14
Life Satisfaction	4.71(1.41)	4.27(1.42)	3.26	0.07
Self-Esteem	4.67(1.25)	4.15(1.23)	5.96	0.02
Wellbeing	3.55(1.07)	3.44(1.06)	.39	0.53
Depression	2.13(0.77)	2.09(0.75)	.075	0.78
Anxiety	2.09(0.80)	2.13(0.86)	.071	0.79

Note: Significantly skewed variables were transformed and re-analysed; however, there were no substantive changes to the results or conclusion.

4.1.2 Condition comparisons at post-intervention and follow-up

Analysis of covariance (ANCOVA) was employed to examine group differences across the six mental health and wellbeing measures at post-intervention and follow-up (Table 6 below). In each analysis, the pre-intervention measure of the same variable was entered as the covariate to control for regression to the mean. At post-intervention, in comparison to the reflective condition, the gratitude condition had slightly higher scores on all positive outcome variables, including gratitude, life satisfaction, self-esteem, and wellbeing, while scores on negative outcome variables were similar (e.g. depression), or slightly higher (e.g. anxiety). None of these between group differences were significant, however. At one-month follow-up there were slight changes in the group differences, but none of these differences were statistically significant (including for mindfulness, a measure that was added at one-month follow-up). Somewhat surprisingly, there were larger mean differences at follow-up for gratitude, self-esteem, depression, and anxiety than at post-intervention, while the mean differences for life satisfaction and wellbeing decreased as expected. At post-intervention and at follow-up, the distribution of scores for anxiety and depression were positively skewed, while gratitude was negatively skewed. Significantly skewed variables were transformed and re-analysed; however, there were no substantive changes to the results.

Table 6

Analyses of Covariance for Post- and Follow-Up Intervention Measures: Adjusted Means and Standard Errors

Variable	<i>M</i> Difference at post- (Gratitude – Reflective)	<i>F</i>	<i>P</i>	<i>M</i> Difference at follow-up (Gratitude – Reflective)	<i>F</i>	<i>P</i>
Gratitude	0.04	0.11	0.74	0.23	1.74	0.19
Life Satisfaction	0.24	2.00	0.16	0.14	0.52	0.47
Self-Esteem	0.06	.24	0.63	0.13	0.55	0.46
Wellbeing	0.20	2.20	0.14	0.04	0.05	0.82
Depression	0.00	.002	0.96	- 0.09	0.67	0.41
Anxiety	0.10	1.18	0.28	- 0.12	0.96	0.33

Note: At post-intervention, $N = 119$; Gratitude $n = 57$, Reflective $n = 62$. At follow-up, $N = 112$; Gratitude $n = 54$, Reflective $n = 58$

While ANCOVA is important in controlling for regression to the mean, it does not look at changes over time. To investigate if there was a significant change from pre- to post-intervention across both groups, and if there were any Time X Condition interactions, repeated measures ANOVAs were employed. These analyses (see Table 7 below) showed a main effect for the intervention across three of the six outcomes, including increases in self-esteem (M difference = 0.13, $p = .05$), and wellbeing (M difference = 0.25, $p = .001$), and decreases in depression (M difference = -0.14, $p = .007$). There was no main effect for the intervention for life satisfaction (M difference = 0.11, n.s.), gratitude (M difference = 0.13, n.s.), or anxiety (M difference = -0.1, n.s.). There were no interaction effects between the time (pre- and post-) and intervention conditions, with both conditions showing remarkably similar changes in gratitude, self-esteem, depression, and anxiety. Notably, participants in the

gratitude condition showed greater mean differences in life satisfaction and wellbeing, however these changes were not significant.

Table 7

Repeated Measures ANOVAs for the Main Effect of Intervention (combined across both groups) from Pre- to Post-Intervention and the Interaction between Intervention and Gratitude versus Reflective groups.

Variable	Intervention Main Effect			Intervention x Condition Interaction			
	Grand <i>M</i>	<i>F</i>	<i>P</i>	Gratitude <i>M</i>	Reflective <i>M</i>	<i>F</i>	<i>P</i>
	Difference			Difference	Difference		
Gratitude	0.13	3.14 ^a	0.08	0.12	0.13	0.01	0.93
Life Satisfaction	0.11	1.61	0.21	0.19	0.05	0.56	0.46
Self-Esteem	0.13	3.89	0.05	0.12	0.14	0.02	0.90
Wellbeing	0.25	11.86	0.001	0.34	0.16	1.70	0.19
Depression	-0.14	7.45	0.007	-0.15	-0.12	0.06	0.81
Anxiety	-0.10	3.71	0.06	-0.05	-0.14	0.86	0.36

NOTE: *N* = 119; Gratitude *n* = 57, Reflective *n* = 62

Main effects for Gratitude vs. Reflective group differences

^a Significantly skewed variables were transformed and re-analysed. There were no substantive changes to the results or conclusion for the analyses with anxiety and depression. However, for gratitude, the marginally significant main effect for time was strengthened ($F=4.37(1,117);p=.04$).

The repeated measures ANOVAs were extended to include the follow-up data, and again examined main effects of the intervention over time (linear and curvilinear), or Time X Condition interactions. For three of the six outcome variables (wellbeing, gratitude, and depression), the analyses showed significant or marginally significant main effects for the intervention across time (wellbeing $F = 4.28, p = .02$; gratitude $F = 2.66, p = .08$; depression

$F = 4.25, p = .02$). There were no significant main effects for the intervention for self-esteem, satisfaction with life, or anxiety, and there were no significant Time X Condition interactions for any of the analyses. The within subject contrasts for wellbeing, gratitude, and depression identified both linear and curvilinear effects. These are displayed in Figures 9, 10, and 11 below. For gratitude (

Figure 9) the linear effect was not significant, but the significant curvilinear effect ($F = 7.28, p = .008$) can be seen for both groups, and was slightly more pronounced for the reflective condition. For wellbeing (Figure 10), there was a marginally significant linear effect ($F = 3.18, p = .08$) and a curvilinear effect ($F = 5.94, p = .02$). The gratitude condition showed a greater increase in wellbeing from pre- to post-intervention, but also a greater decrease to follow-up. Finally, for depression (Figure 11), there were small but significant linear ($F = 4.35, p = .04$) and curvilinear effects ($F = 4.09, p < .05$) that can be seen in the gratitude and the reflective conditions respectively.

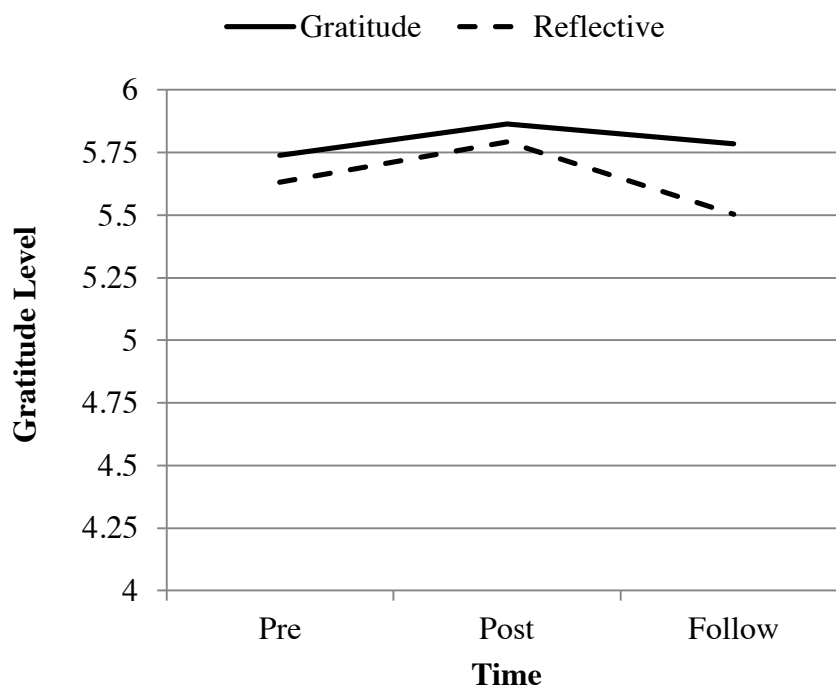


Figure 9. Main effects for the intervention over time on gratitude in the gratitude and the reflective conditions.

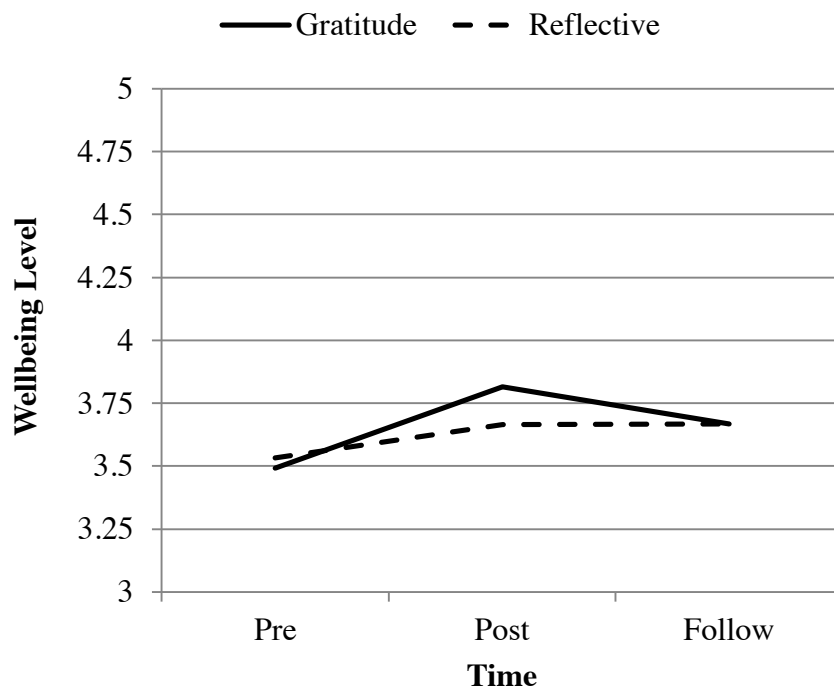


Figure 10. Main effects for the intervention over time on wellbeing in the gratitude and the reflective conditions.

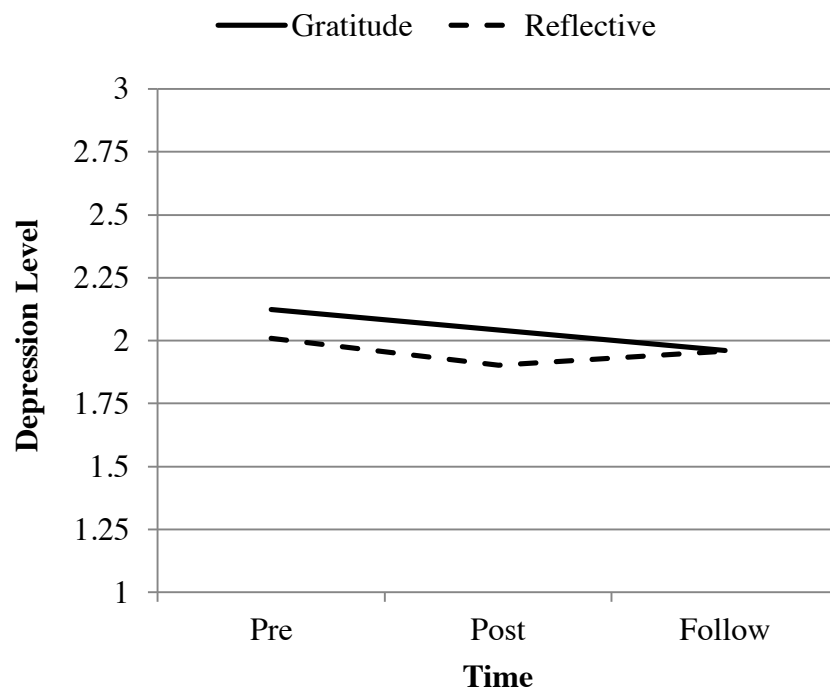


Figure 11. Main effects for the intervention over time on depression in the gratitude and the reflective conditions.

4.1.3 *Growth-curve and moderation analyses*

As mentioned above, the repeated measures analyses with analysis of variance is able to consider the effect of the intervention over time across both conditions; however, it does not control for regression to the mean as the analysis of covariance did in Table 6. Another limitation with repeated measures ANOVAs is that the main effect of time is treated as a categorical variable and the residuals are defined as the deviation from the group means at each time point (Liu, 2008). Thus, repeated measures ANOVAs cannot examine the aggregate effect of individual change over time. Recently, many researchers have advocated that data with repeated measures should be analysed with growth-curve analyses in order to overcome some of these limitations with repeated measures ANOVAs (Liu, 2008), and thus I consulted with two experts in these types of analyses. Both individuals independently analysed the data with two different growth-curve analytic approaches – generalised estimating equations and hierarchical linear modelling (often called multi- or mixed-level modelling). These two approaches yielded very similar results, and there was also general consensus with the ANOVA results, albeit a few differences. These results are summarised below:

1. Replicating the pattern of results in Table 5 and Table 6, when a baseline model of linear change was tested across all variables, there was a significant difference at pre-intervention across the group conditions for both satisfaction with life ($b = 0.47$, $SE = 0.24$, $p = < .05$) and self-esteem ($b = 0.52$, $SE = 0.21$, $p = .02$). However, all of the simple slopes measuring linear change overtime were non-significant.
2. When linear and a curvilinear effects for time were included in the same analysis, similar to the repeated measures ANOVAs there was no significant effect between groups or over time for the outcome variables of satisfaction with life and self-esteem.

3. When linear and a curvilinear effects for time were included in the same analysis for gratitude, similar to the repeated measures ANOVAs there was no significant effect between conditions, but there was a significant linear change ($b = -0.23$, $SE = 0.12$, $p = < .05$) and a marginally significant curvilinear change ($b = 0.09$, $SE = 0.06$, $p = .09$) over time.
4. When linear and a curvilinear effects for time were included in the same analysis for depression, similar to the repeated measures ANOVAs there was no significant effect between conditions, but there was a marginally significant linear change ($b = 0.36$, $SE = 0.20$, $p = .07$) and a significant curvilinear change ($b = -0.21$, $SE = 0.10$, $p = .03$) over time.
5. In contrast to the repeated measures ANOVAs, when linear and curvilinear effects for time were tested for wellbeing, there was no significant change for either time effect.
6. In contrast to the repeated measures ANOVAs, when linear and curvilinear effects for time were tested with anxiety, there was a significant linear change ($b = -0.26$, $SE = 0.13$, $p = .004$) and a marginally significant curvilinear change ($b = 0.11$, $SE = 0.06$, $p = .07$) over time.

One of the advantages of growth-curve analysis is that interaction effects can be tested across group conditions, time (linear and curvilinear), and individual differences. To examine if depression or anxiety moderated the effect of the intervention across time or between conditions, the growth curve analyses were extended and participants' pre-intervention depression and anxiety scores were included (separately) in analyses that tested the patterns of change and interactions across the four positive outcome variables. Of these eight analyses (four with anxiety as a moderator and four with depression as a moderator), there was only one where there was a significant interaction.

Table 8 displays the results for the growth-curve analysis for wellbeing with depression as the moderating variable. The results show that when depression was included in the model, there was a significant effect for time (both linear and curvilinear). Across conditions, participants showed a slight increase in wellbeing that declined at follow-up. There was no significant interaction between time and condition. As expected, there was a rather large effect for participants' initial scores on depression. Those with higher scores on depression had lower wellbeing across all time points. This significant difference was qualified by two significant interactions that are displayed in the two graphs below.

Table 8

Estimates of fixed effects. Growth-curve analysis for wellbeing with depression as the moderating variable.

Parameter	Estimate(SE)	t	P
Wellbeing Intercept	3.50(0.07)	52.13	.00
Time	0.44(0.12)	3.74	.00
Time2	- 0.17(0.06)	- 3.07	.002
Condition	0.06(0.07)	0.84	.40
Time * Condition	0.16(0.12)	1.37	.17
Time2 * Condition	- 0.08(0.06)	- 1.44	.15
Pre-Depression Average	- 1.08(0.09)	- 12.01	.00
Time * Pre-Depression Average	0.42(0.16)	2.63	.009
Condition * Pre-Depression Average	- 0.02(0.09)	- 0.22	.83
Time * Condition * Pre-Depression Average	- 0.41(0.16)	- 2.57	.01
Time2 * Pre-Depression Average	- 0.10(0.08)	- 1.33	.19
Time2 * Condition * Pre-Depression Average	0.17(0.08)	2.22	.03

As depicted in Figure 12, gratitude condition participants with low-levels of depression at pre-intervention showed an increase in wellbeing from pre- to post-intervention. However, at follow-up, wellbeing levels dropped to slightly lower levels than what they were at pre-intervention. In contrast, reflective condition participants with low-levels of depression at pre-intervention showed a decrease in wellbeing from pre- to post-intervention, and this decrease remained through to follow-up.

Participants with high levels of depression at pre-intervention started lower in wellbeing than those with lower levels of depression did (Figure 13) In both conditions, participants with high levels of depression showed increases in wellbeing from pre- to post-intervention, effects of which plateaued at one-month follow-up. Notably, the effect on wellbeing among these participants with high levels of depression was slightly greater in the reflective condition.

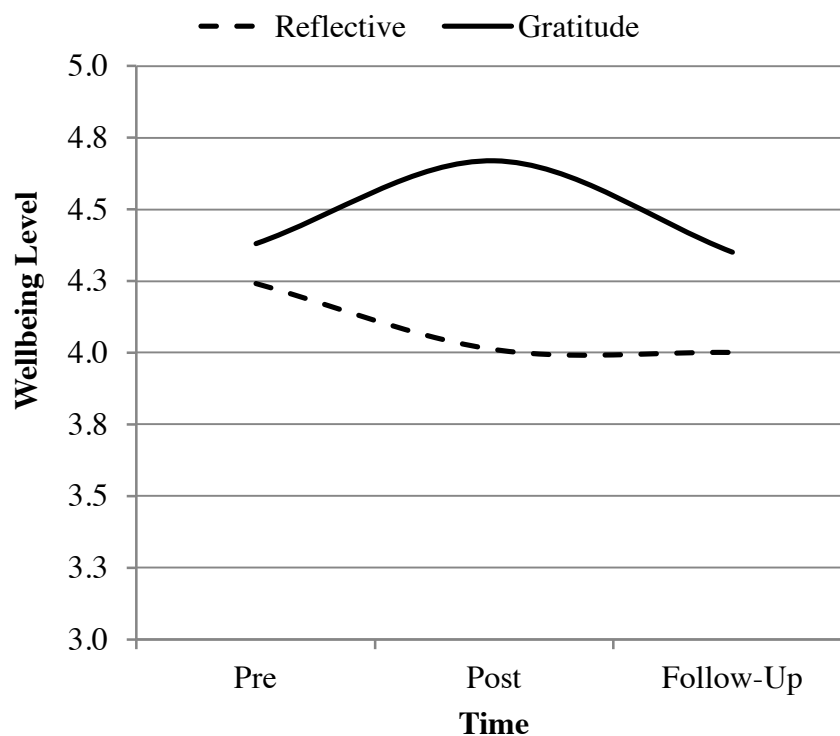


Figure 12. Effect of the intervention across time on wellbeing among those with low levels of depression at pre-intervention.

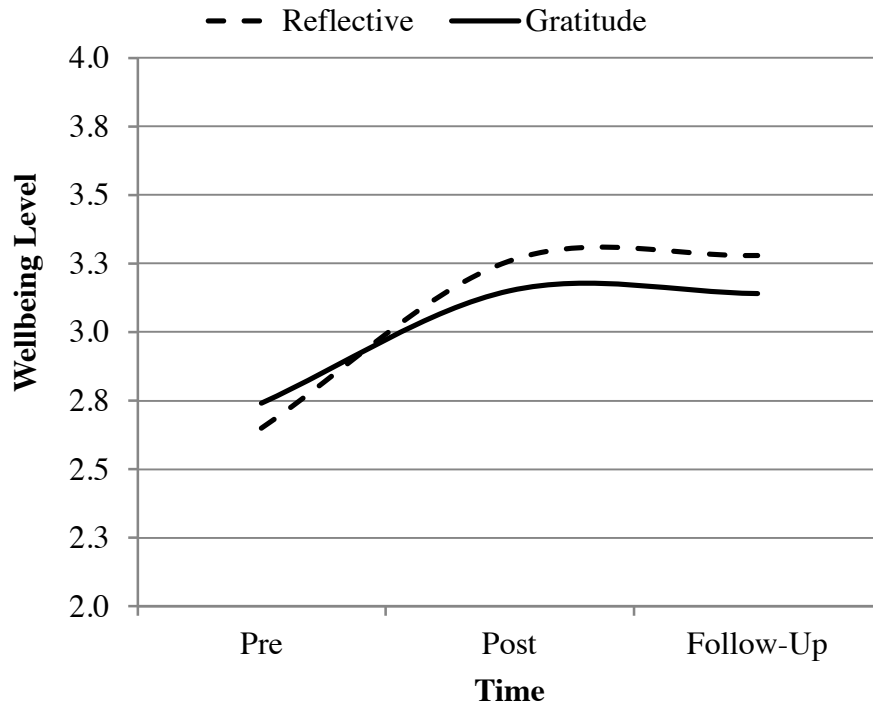


Figure 13. Effect of the intervention across time on wellbeing among those with high levels of depression at pre-intervention

4.2 Delivery of intervention

4.2.1 Engagement

As illustrated in Table 9, voluntary drop-out was low, but only occurred in the gratitude condition ($n = 5$, $X^2=5.19$, $p<.02$). Five participants (2 reflective, 3 gratitude; $X^2=0.21$, $n.s.$) were also pulled from the study after not replying for 14 days, as it was considered they were not actively participating in the intervention. Of the 126 participants who completed the intervention, 94.44% ($n = 119$) of participants (62 reflective, 57 gratitude; $X^2=1.68$, $p<.19$) completed the questionnaire. The follow-up questionnaire was open to all participants who completed the intervention and was completed by 88.89% ($n = 112$) of participants (58 reflective, 54 gratitude; $X^2=0.81$, $p<.37$). Four-fifths ($n = 109$, 86.51%) of participants completed all three questionnaires (56 reflective, 53 gratitude; $X^2=0.42$, $p<.52$).

Over the course of the intervention, 11,279 text-messages were sent and received from the text application (7309 outgoing, 3970 incoming). Outgoing text-messages included sign up text-messages and common replies that were not responded to, and thus explain the large discrepancy between the number of outgoing and incoming messages. Engagement was relatively high throughout the intervention period, with over three-quarters (85.6%) of participants who completed the intervention ($n = 126$) replying to at least 22 of the 28 text-messages within 24 hours of receiving the message. Including participants who did not complete the intervention, the number of questions that were not answered was significantly higher in the gratitude condition (390/1904, 20.48%) than in the reflective condition (134/1904, 7.04%; $X^2=145.03$, $p<.001$). Notably, the number of questions that were not answered increased in both conditions each week (reflective: week 1 = 21, week 2 = 33, week 3 = 34, and week 4 = 46; gratitude: week 1 = 53, week 2 = 101, week 3 = 109, week 4 = 127). Late replies (i.e. participant replies sent more than 48 hours after the question was sent) were also higher in the gratitude condition (165 late replies: week 1 = 22, week 2 = 39, week 3 = 53, week 4 = 51) than in the reflective condition (83 late replies: week 1 = 14, week 2 = 25, week 3 = 23, week 4 = 21; $X^2=29.00$, $p<.001$).

Table 9

Level of engagement in each condition

Variable	Reflective	Gratitude	X^2	P
Number of questions not answered	134/1904 (7.04%)	390/1904 (20.48%)	145.03	$p<.001$
Week one	21	53		
Week two	33	101		
Week three	34	109		
Week four	46	127		
Number of late replies (i.e. >24 hours)	83/1904	165/1904	29.00	$p<.001$

Variable	Reflective	Gratitude	X^2	P
Week one	22	14		
Week two	39	25		
Week three	53	23		
Week four	51	21		
Voluntary drop-outs	0	5	5.19	$p<.02$
Number of participants pulled from study	2	3	0.21	$n.s.$
Questionnaires completed				
Pre-Intervention	68	68	n/a	n/a
Post-Intervention	62	57	1.68	$p<.19$
One-month Follow-up	58	54	0.81	$p<.37$
Pre-, Post-, and Follow-up	56	53	0.42	$p<.52$

Participants who completed the post-intervention questionnaire said that their most common reason for not replying to some of the text-messages was because they forgot ($n = 47$, 39.50%). Other reasons included technical issues, being too busy to reply, wanting time to think about the question but then forgetting to reply, and not liking the questions. Another measure of engagement was how often the participants shared the text-messages that they received; a little more than half ($n = 71$, 59.66%) of the 119 participants who completed the post-intervention questionnaire reported occasions where they shared the daily text-messages with others. Of participants who completed the post-intervention questionnaire, just over one-third ($n = 43$, 36.13%) shared the text-messages 1-3 times, while 11 (9.24%) shared them 4-6 times, and 17 (14.29%) reported sharing the text-messages more than 7 times. There were no significant group differences in the number of times participants shared text-messages.

Reasons for sharing the text-messages were not given.

4.2.2 Text-message responses

Tables 10 and 11 provide examples of text-message questions and the replies that were sent by participants. In both conditions, it was evident that participants varied in how they interpreted the questions. Some participants also went into significant detail in their responses (particularly in the gratitude condition), while other participants answered briefly. On average, participants in the gratitude condition sent reply text-messages that were more than twice the length (96.65 characters) of participants' replies in the reflective condition (44.57 characters). There was also significant range in the average character count of participants' replies each day. In the reflective condition, average character lengths ranged from 14.41 characters (Day 24) to 97.77 characters (Day 2). In the gratitude condition, average character lengths ranged from 62.48 characters (Day 21) to 146.04 characters on (Day 23).

Table 10

Example text-message questions and participant replies in the gratitude condition

Question:	Example Participant Replies:
Day 5: Think about ur favourite memories. What/who r u thankful 2 for making these memories a favourite?	<p>"My mum because she spent lots of time with me and my little brother his innocence and that he didn't judge" <i>19 year old female</i></p> <p>"We live in such a clean beautiful environment" <i>16 year old female</i></p> <p>"Form time at school I'm thankful for my friends for making it fun" <i>16 year old female</i></p> <p>"I'm thankful to my dad for organising family holidays away and being able to experience so many different things" <i>20 year old female</i></p>
Day 9: Think about an important lesson that u learnt in the last year. Who are u thankful to for teaching u this lesson?	<p>"I learnt a lesson from one of my lecturers. He said that "you can't expect to succeed if you keep living with your failures" it's applicable to life!" <i>19 year old female</i></p> <p>"There's no point in living in the past. It makes you unhappy. Myself"</p>

Question:	Example Participant Replies:
	<p style="text-align: right;"><i>19 year old male</i></p> <p>“She was extremely kind and had a great influence on me growing up, and helped develop myself into the person I am now”</p> <p style="text-align: right;"><i>16 year old female</i></p> <p>“Katie and Kaela”</p> <p style="text-align: right;"><i>20 year old female</i></p>
<p>Day 20: Think about some of the challenges in ur life. Looking back, what is it about these challenges that u can b thankful 4?</p>	<p>“I am thankfull for the challanges in my life as they have made me who i am today and they have given me more confidence and a chance to help others going through the same problem”</p> <p style="text-align: right;"><i>19 year old female</i></p> <p>“That i stuck to my values”</p> <p style="text-align: right;"><i>17 year old female</i></p> <p>“I can be thankful that it has shaped me to be the strong and loving person that God intends me to me. I can be thankful for it being an experience, that it's something I can help people out with”</p> <p style="text-align: right;"><i>17 year old male</i></p> <p>“They have prepared me with the tools needed to get through challenges in the future”</p> <p style="text-align: right;"><i>16 year old male</i></p>
<p>Day 28: Here's ur last daily question! Think about the things that you're thankful for. What r the top 3 things that u are thankful for?</p>	<p>“Thankful for the way I am looks personality I am also thankful fpr the fact that I am quite smart at times and that I have great people supporting me parent etc”</p> <p style="text-align: right;"><i>17 year old male</i></p> <p>“Day 28: I'm most thankful for my cat! Haha, he's great! Then it would be the opportunities I have. Without these I wouldn't be who I am today. The third biggest thing I'm thankful for is my talents. Again, they represent me and are the basis of who I am today!”</p> <p style="text-align: right;"><i>16 year old male</i></p> <p>“1. A supportive & loving family. 2. A peaceful country. 3. Opportunities to further my education with resources that I have easy access to!”</p> <p style="text-align: right;"><i>20 year old female</i></p> <p>“The chance to put change in action, that every day is a clean start, that I am capable and things can get more positive :)”</p> <p style="text-align: right;"><i>20 year old female</i></p>

Table 11

Example questions and text-message replies in the reflective condition

Question:	Selected Participant Replies:
Day 1: If u were invited to a costume party, who/what would u go as?	<p>“Whatever was easiest, probably a sheep” <i>21 year old female</i></p> <p>“Cokie Monster” <i>17 year old male</i></p> <p>“I would love to go as a smurf” <i>19 year old female</i></p> <p>“Something funny and/or clever- writing on my T shirt "404 Costume Not Found" maybe” <i>17 year old female</i></p>
Day 8: What would u do if u had a magic wand?	<p>“Find all the stuff I've lost” <i>16 year old female</i></p> <p>“Make myself in charge of everything” <i>16 year old female</i></p> <p>“...I would point it at my bank account and get myself on the best holiday ever” <i>21 year old female</i></p> <p>“Help people suffering become happy and to cure all sick people” <i>16 year old male</i></p>
Day 19: What's another culture that u would like 2 find out more about? Y?	<p>“Maori cause they're our own and I don't know much about them” <i>21 year old female</i></p> <p>“Middle Eastern cultures because they appear to be least like my own” <i>17 year old female</i></p> <p>“Definitely African. They seem to handle hardship so completely differently I think it's very cool” <i>16 year old female</i></p> <p>“I'm not sure, to be honest. Probably my own culture, my dads culture - Indo-Fijian, because I barely know anything about it” <i>17 year old male</i></p>
Day 25: What do u find is the best way 2 relax?	<p>“Spending time with close friends and talking about life :D” <i>17 year old female</i></p> <p>“Walking down the beach with good music on the iPod” <i>16 year old female</i></p> <p>“Sleeping” <i>16 year old male</i></p> <p>“Swing on the swings at the playground followed by countless cups of hot chocolate with marshmallows while watching back-to-back kdrama on the lazyboy. :)” <i>17 year old female</i></p>

4.2.3 Intervention delivery issues

Few issues were encountered during the delivery on the intervention. Managing 136 participants each day on the text-application was a demanding and time-consuming task. Text-messages were sent in the morning (between 8am and 11am), afternoon (between 12 and 4pm), or evening (4.30pm to 7pm). At each of these intervals, it took approximately one hour to send the text-messages. The text-application also had to be monitored throughout the day (8am – 10pm) to read and respond to incoming text-messages. The manual process of sending the text-messages resulted in the delivery approach being particularly prone to human error. In one incident, two participants with similar IDs were sent the wrong daily questions. That is, a gratitude question was sent to a participant in the reflective condition, and a reflective question was sent to a participant in the gratitude condition. This mistake was corrected before the participants replied, and they received a further text-message asking them to ignore the first question. Upon the completion of the intervention, it was found that there was also one incident where a participant did not receive one of their daily questions at all.

Participant feedback (described in section 4.3) also highlighted that some of the questions in the gratitude condition were too abstract and difficult to understand, including day 19's question, "What's something u consider 2 b beautiful? What can u b thankful 4 about this experience?", and day 21's question, "Think about some of the things that u are thankful 4. Out of these things, what is the smallest thing that u r thankful 4?". Issues were also highlighted with two of the reflective condition questions. First, day one's question, "If u were invited to a costume party, who/what would u go as?" had no theme. Anyone who asked what the theme was received a reply saying "Let's say the theme was to come as your favourite actor or actress, who would you come as?". Another question, day 22's, "What's the best restaurant you've ever been 2", assumed that people had experienced going to a restaurant, however some participants indicated that they had not. These participants received

a reply saying that that was okay, followed by that day's common reply. Other participants who did not have an answer for this, or other questions, are likely to have simply not replied.

4.2.4 Action on risk management plan

As outlined in sections 3.1 and 3.4.1, the study's risk management plan involved recommending Youthline's services to any participants who expressed signs of risk or negative emotions, or to those who requested support. There were no serious incidents where participants were referred directly to Youthline's services, however one participant did ask to be forwarded onto the Youthline text-counselling queue on three separate occasions. Due to the set up of the queue, all incoming text-messages from the participant had to be manually forwarded to the text-counselling queue, however the researcher could not see the conversation between the text-counsellor and the participant.

A small number of participants expressed negative emotions and/or potential risk, and were informed of Youthline's services. It was appreciated that many of these text-messages were not likely to indicate immediate risk, and thus text-messages informing participants of Youthline's services were phrased as if they were a generic text-message advertising Youthline's services, as opposed to a text-message advising them to get help. For example, in one incident, a participant responded to the question, "What do you and your friends do for fun?", with "Drugs and Alcohol". It was not known whether the participant was making a joke of the question, answering honestly, or indicating a call for help. To ensure that all grounds were covered, the participant was informed of Youthline's services.

The following two examples illustrate where text-messages indicated negative emotions, and where it was believed the participant may benefit from Youthline's services. Notably, the choice to contact Youthline was left with the participants to help maintain autonomy. One recruiter did highlight however that some participants (i.e. those recruited from youth

agencies) may already have risk management plans in place, and thus referring them on to Youthline may have only added another service in the mix. Thus, as illustrated in example two, it was important that it was established what existing support a participant may have (especially if they referred to having a mental illness).

Example one:

Text-message conversation with a 19-year-old Female (Gratitude condition)

MindfulTXT	“Day 14: Think about ur day. What r some of the things that u can b grateful 4 today?”
Participant	“I'm not greatful for anything today. Everyone and everything can get [f*****]”
MindfulTXT	“Sorry to hear that, is there anything that you want to speak to someone about? We can forward you to Youthline's TXT service, or you can call them on 0800376633”
Participant	“No its ohkaay I'll get over it”
MindfulTXT	“Ok, just let us know if you change your mind :)”

Example two:

Text-message conversation with a 17-year-old Female (Gratitude condition)

MindfulTXT	“Day 3: Think about the possessions u have. What is it about these that u r thankful 4?”
Participant	“I'm not really thankful for anything. Everything is going real bad”
MindfulTXT	“Sorry 2 hear that, what's going bad for u at the moment?”
Participant	“I think the depression is coming back, but at least it's Friday so I can try and do some fun stuff tomorrow :)”

MindfulTXT	“Great you're looking forward to the weekend to do fun stuff :) Do u have support and ways of managing ur depression if it is coming back?”
Participant	“Yes, I am going to try and make an appointment with the counsellor next week, and I am going to the pharmacy today to get a repeat of my medication”
MindfulTXT	“Ok, great to hear you've got support and r looking after urself :) U can call Youthline on 0800376633 if you do want to chat about anything before next week”

While replies that indicated risk were managed through the risk management strategy, there were three questions that commonly resulted in negative replies (including day 2's question in the gratitude condition, and the reflective condition questions on days 9 and 23). The researcher personally managed these replies, as it was evident that such replies were likely to be specific to the question, rather than people's everyday lives. The following example (example three) demonstrates the researcher's standard approach to managing any negative replies to day two's question in the gratitude condition;

Example three:

Text-message conversation with an 18-year-old Female (Gratitude condition)

MindfulTXT	“Day 2: What talent/strength do u have that u r thankful 4?”
Participant	“I don't feel that thankful for any strength or talent in particular today”
MindfulTXT	“That's ok, sometimes it takes time 2 recognise ur talents/strengths (e.g. in sport, school, talking 2 people) - just let us know when you think of some”
Participant	“I guess a strength of mine is balancing all my commitments so I still contribute to everything”
MindfulTXT	“Thx 4 ur reply!”

In the reflective condition, there were two questions that commonly resulted in a negative reply. Day 9's question, "If u had to enter a talent show, what talent would u show off?", commonly resulted in participants saying that they did not have any talents. Like in the above example in the gratitude condition, any such participants who said that they have no talents received the following reply, "That's ok, sometimes it can take time to think about our talents and skills. Just let us know when you think of something". A number of participants also described themselves negatively in response to day 23's question, "How would u describe urself to some1 who doesn't know u?". Any such participants received the following reply; "How about something cool about yourself that u want others to know about you?"

Although it was only the above questions that tended to receive a negative reply, both post-intervention and follow-up questionnaire feedback suggests that there were other questions that participants did not like because of the emotions they brought up. These included questions that asked about stressful or challenging life events (e.g. "Day 8: Think about a stressful time in ur life. Who are u thankful 2 for helping u through that time?"), and questions that asked participants to think about the things in life that they were taking for granted (e.g. "Day 16: Think about some of the things in ur life that u think u may b taking 4 granted. What's 1 thing that you're taking for granted that you're thankful 4?"). It was also noted that the automatic reply (sent between 10:00pm and 8:00am) came across as blunt and impersonal, especially when people were in a happy space after replying to the text-messages. However, as Youthline's services are not 24/7, it was important that people knew of other services that they could contact in an emergency should they have wanted to talk to someone.

Finally, as has been exemplified in this section, there is no control over how participants reply to the daily text-messages. Indeed, there were some text-message responses that included swearing and inappropriate replies. The standard common reply was not deviated from in all but one of these incidents, after a participant in the reflective condition (21 year

old male) sent four consistent inappropriate replies. The participant replied more appropriately after receiving the following text-message; “Thx 4 ur reply, we've noticed some of ur replies are not cool for this study. Plz try & answer the questions more appropriately, otherwise ur txts will stop. Thx!”

4.3 Subjective evaluations

At the end of both the post-intervention and follow-up questionnaires, participants were asked to evaluate their experiences of taking part in the study. At post-intervention, questions centred around how they viewed the exercise of replying to daily text-messages, how much they felt the intervention had impacted them, in addition to what they did and did not enjoy about the study. At follow-up, questions were centred around how much they thought about or engaged with the text-messages that they received during the intervention, and how much they thought the intervention helped them to think more positively and/or to minimise negative thoughts in the one-month post-intervention. The following paragraphs outline the common themes that were identified in participants’ responses to each of the questions. Responses are arranged from the most to least representative, and the percentages are calculated from the number of participants who completed the post- ($n = 119$, reflective = 62, gratitude = 57) and follow-up questionnaires ($n = 112$, reflective = 58, gratitude = 54), respectively.

Interestingly, at post-intervention, there were significant group differences in how participants viewed the exercise of replying to a daily text-message question. Almost half of the gratitude condition participants indicated that the exercise felt like they were keeping a private diary, compared to just over one quarter of reflective condition participants (reflective = 29.03%, $n = 18$; gratitude = 47.37%, $n = 27$; $X^2 = 4.25$, $p < .04$). By contrast, reflective condition participants were significantly more likely to indicate that the exercise felt like they

were having a conversation with someone (reflective = 50%, $n = 31$; gratitude = 28.07%, $n = 16$; $X^2=5.98$, $p<.01$). Other participants said that the study felt like a survey, an opportunity for self-exploration, or that the text-messages were a hassle, annoying, or insignificant.

At post-intervention, participants were asked whether or not they had noticed any changes in their physical and/or emotional feelings while taking part in this study. They were also asked if they had noticed any differences in how they thought about themselves and/or their lives since participating in the study. Responses to these two questions were similar, and thus common themes are described together below. More than half of the gratitude condition participants ($n = 35$, 61.40%) reported having higher gratefulness and recognition of the things that they do have in life. Interestingly, in the reflective condition, a small number of participants ($n = 6$, 9.68%) also felt more grateful, and a further 5 (8.01%) felt that they had a better understanding of themselves. A quarter of participants across both conditions reported feeling happier, enthusiastic, and more positive, including helping them to see the positive side of negative emotions (reflective, $n = 18$ (29.03%); gratitude, $n = 17$ (29.82%)). As identified in section 4.2.4, a small number of participants said that the study brought up negative emotions (e.g. what they took for granted, what they wanted to change about themselves).

At post-intervention, participants were asked to rate how much they enjoyed the study on a scale of 1 to 5. Enjoyment of the study was high across both conditions ($M = 4.32$), and there were no significant differences between conditions. When asked what they enjoyed about the study, participants across conditions indicated that they like the daily interaction and routine, and ease of the study, in addition to being able to reply in their own time and the being relatively non-obtrusive. Participants also enjoyed the opportunity to be able to reflect on their own lives and to think about different things in life, including things that they do not normally attend to (e.g. stress, challenging negative thoughts). Participants in both conditions

also indicated that they enjoyed the variety of questions. In the gratitude condition, participants liked the positive nature of the questions and felt like they were helping them to see things that they otherwise overlooked, while reflective condition participants commented on their fun and quirky nature. The majority of participants (94.96%, $n = 103$) said that they would recommend the study to other people their age (reflective, $n = 60$ (96.77%); gratitude, $n = 53$ (92.98%); $X^2=0.89$, *n.s.*). The few participants who said that they would not recommend the study said so because they thought it was a hassle or boring, that they could not think of anyone who would be interested, and that the questions were too ‘thankful oriented’.

At post-intervention, the majority of participants indicated that there was nothing that they did not enjoy about the study (gratitude, 73.68% ($n = 42$); reflective, 88.71% ($n = 55$)). Of the few participants who did not enjoy the study, reflective condition participants felt that some of the questions were boring, insignificant and shallow, while gratitude condition participants felt that some of the questions were too hard, confusing, or repetitive. Participants in both conditions also indicated they did not like the timing of the text-messages, forgetting to reply, and when the questions unlocked negative thoughts, such as what they took for granted. These concerns were few, however.

At one-month follow-up, at least half of the participants in each condition indicated that, over the previous month, they had thought about the text-messages that they received (reflective, 51.72% ($n = 30$); gratitude, 64.82% ($n = 35$); $X^2=1.97$, *n.s.*). At least a quarter of participants in each condition had also looked back over some of their text-messages (reflective, 32.76% ($n = 19$); gratitude, 25.93% ($n = 14$)) ($X^2= 0.63$, *n.s.*). Overall, on a scale of 1 to 5, participants felt that the study had ‘somewhat’ ($M = 2.93$) helped them to think positively and/or to help minimise negative thoughts in the one-month since completing the intervention, and there were no significant mean differences between conditions in regards to

this question (reflective $M = 2.88$; gratitude $M = 2.98$). Participants who did not find the study useful indicated that that was the case because they did not feel any different to how they did at the start of the study ($n = 34$, gratitude, 27.78% ($n = 15$); reflective, 32.76% ($n = 19$)), that they did not need help before the study (gratitude, 7.41% ($n = 4$); reflective, 6.90% ($n = 4$)), or that there were other things going on in their life that the study may not have been able to help over and above of (gratitude, 3.70% ($n = 2$); reflective, 1.72% ($n = 1$)).

5 Discussion

Recent literature demonstrates the need for youth-friendly interventions to support the development of positive youth mental health and wellbeing, a need that the current study contributes to significantly. The first aim of this study was to investigate the effectiveness of a text-message-based gratitude intervention on youth mental health and wellbeing. A second aim was to investigate the feasibility of this approach with youth aged 16-21 years. The remainder of this discussion is organised according to these two aims. Accordingly, the first section of this discussion examines the results of the intervention and compares the study to the variety of other gratitude interventions. The second section of this discussion focuses on engagement and interaction, followed by a critique of the study's key feasibility aspects. This discussion deviates from the traditional discussion in that it discusses research limitations and recommendations throughout, which comes with the nature of pilot-testing such a novel approach. The discussion ends on a section of future development and recommendations of how the approach could be adapted for other health promotion topics.

5.1 Aim one: Effectiveness of a text-message-based gratitude intervention on youth mental health and wellbeing

To investigate the effect of a text-message-based gratitude intervention on youth mental health and wellbeing, six key mental health and wellbeing variables were measured at pre-, post- intervention and one-month follow-up. The following provides an overview of the study's findings in relation to the three questions listed below that were investigated under this aim.

- a. What is the effect of asking gratitude-based questions each day on youth mental health and wellbeing immediately post-intervention?

- b. Are any effects of the intervention on youth mental health and wellbeing still significant at one-month post-intervention?
- c. Are there any moderating factors that could impact the effectiveness of the intervention?

The first research question, ‘What is the effect of asking gratitude-based questions each day on youth mental health and wellbeing immediately post-intervention?’, assumed that the gratitude intervention would have an effect on the outcome variables assessed. However, contrary to the study’s hypothesis, results showed no significant between-group differences at either immediately post-intervention, or at one-month follow-up. Interestingly however, at post-intervention, there were main effects for the intervention in general (both groups combined), including increases in self-esteem and wellbeing (qualified by a significant interaction), and decreases in depression. There do not appear to be any gratitude interventions that have assessed self-esteem; however, other gratitude studies have seen increases in wellbeing and/or decreases in depression in gratitude condition participants (Froh, Kashdan, et al., 2009; Harbaugh & Vasey, 2014). Unfortunately, as the current study showed no between-group differences, it cannot be concluded whether the improvements in self-esteem, wellbeing, and depression were attributable to daily gratitude practice itself, or some other factor. This is explored in section 5.1.1.

At one-month follow-up, repeated measures ANOVAs found a significant curvilinear effect on gratitude that was more pronounced in the reflective condition, and further growth curve analyses found that both the curvilinear and linear effects were significant. Repeated measures ANOVAs also found a significant linear and curvilinear effect for wellbeing, however this was not replicated with the growth curve analyses. Finally, repeated measures ANOVAs found significant linear and curvilinear changes for depression, which were both

replicated with the growth curve analyses. Few gratitude interventions have assessed measures long term; those that have assessed measures long term have typically seen results drop off from immediately post-intervention through to follow-up (Seligman et al., 2005). Notably however, a recent study has found an increase in wellbeing in the gratitude condition from post-intervention to five-week follow-up (Watkins et al., 2014).

The final research question investigated whether the study had any moderating effects. The only significant moderator found in the current study was when depression was added to the wellbeing model, where both significant linear and curvilinear effects for time were found. Among those with higher levels of depression, lower levels of wellbeing were reported at all time points in comparison to those with lower levels of depression. Participants across conditions with high levels of depression showed increases in wellbeing from pre- to post-intervention, an effect that persisted through to follow-up. Among those with low levels of depression, gratitude condition participants showed increases in wellbeing from pre- to post-intervention, however wellbeing then declined from post-intervention to follow-up. In contrast, reflective condition participants with low levels of depression showed a decrease in wellbeing from pre-intervention through to follow-up. These results suggest that the intervention itself had a more pronounced positive effect for people with high levels of depression, and that daily gratitude practice had an effect on wellbeing for those with low levels of depression. This is consistent with studies that have found that people low in positive affect benefit the most from gratitude interventions (Froh, Kashdan, et al., 2009; Rash et al., 2011), but few studies have seen these changes persist through to follow-up.

5.1.1 Study design: explaining post- and follow-up findings

It was surprising that there were no between-group differences, especially for gratitude. Existing gratitude interventions have asked participants open-ended questions about what

they are thankful for (e.g. gratitude-listing interventions) (Froh et al., 2008; Rash et al., 2011; Sheldon & Lyubomirsky, 2006), or to whom they are grateful for and why (e.g. gratitude letter, contemplation, and visit interventions) (Lyubomirsky et al., 2011; Toepfer & Walker, 2009). By contrast, the current study attempted to induce gratitude through a novel approach that aimed to illustrate the varying things that people may be grateful for by asking participants to think about something specific (e.g. a person, nature, experiences), and what they were thankful for in relation to each of these. Such an approach also aimed to minimise the risk of a repetitive response bias seen in other studies, and also aimed to minimise demands on self-regulation.

Lyubomirsky et al. (2005) argue that gratitude interventions are most effective when distributed on a regular basis, and when individuals willingly, and intentionally, engage with them in their everyday lifestyles. The design of the current study employed a gratitude intervention that was more *intensive* than previous studies (e.g. Froh et al., 2008; Rash, 2011; Sheldon, 2006), facilitating daily engagement for four weeks. The text-message approach provided a platform for supporting participants to engage with gratitude exercises on a daily basis by probing participants each day to practise gratitude via the daily text-message question, thus placing little demands on participants' self-regulation. The variety of questions are also likely to have helped participants to think about the different things in life that they can be thankful for in their everyday lives. Indeed, several participants indicated that they now thought about what they were thankful for in life more often, and that they looked for the smaller things in life more, above and beyond what the questions asked. The daily questions may have helped participants to form a daily habit of what they are thankful for, even beyond the intervention period. Nonetheless, participants may have been reliant on receiving the text-messages as reminders to practise gratitude, rather than assisting them to make a habit of practising gratitude after the intervention had stopped.

As Table 10 demonstrates, gratitude condition participants varied in how they interpreted each of the questions, and attributed gratitude to a wide array of themes. Some questions were answered at length and specified details of the grateful experience, while other participants' replies were considerably briefer. It was evident in many of the longer responses that participants thought about the thing(s) that they were grateful for, how it had benefited them, and how they can show gratefulness back to their benefactor and/or others. Such deeper thoughts are important to the experience of gratefulness (as discussed in section 2.1). It is also possible however that some participants did think in more depth about their replies, but did not communicate this at length over text-message.

Despite the study's more intensive approach and evidence that gratitude condition participants engaged with the intervention, it is possible that the questions did not induce gratitude to the same extent as other gratitude interventions. Firstly, asking people to think about how they are grateful for something specific each day could have actually restricted what they attribute gratitude to. The amount of gratitude that a participant attributes to nature, for example, may be minimal in comparison to other things that they are grateful for, such as family and friends. Second, the majority of questions also asked about past experiences, and thus may not have been able to elicit the same extent of gratitude to what people were grateful for in contrast to a daily free-response listing exercise. Thirdly, a few participants indicated that the questions were repetitive, and could lead to a repetitive response bias and/or affect engagement. How repetitive participants found the questions is likely to be dependent on how grateful they are, and what experiences they have to attribute gratitude to. Finally, several of the questions asked about participants' personal strengths and talents, however the question of whether one can be grateful towards oneself, or if this is instead *pride* has recently been challenged. As Watkins (2014) argues, "Affirming that I am responsible for something good is essentially the appraisal that leads to pride, a very different emotion from gratitude" (p.18).

All of the points discussed in this section illustrate that the study would benefit from asking more open-ended questions about what people are grateful for. This could be achieved by simply asking an open-ended question such as, “What are you grateful for today?”. This could risk becoming too boring and repetitive for participants, however, and it would not teach people about the varying ways in which we can be thankful. Thus, another approach could be to introduce coaching questions whereby participants are introduced to a topic and then asked what they are grateful for. For example, “People can be thankful for things in the natural environment. What are you thankful for today?” Questions phrased in such a manner would not restrict participants to expressing gratitude for something specific, but would still allow them to learn about the varying ways in which we can be grateful. A significant gap in research is how intensive gratitude interventions need to be to maximise their effectiveness. In an effort to explore this, a second, higher intensity gratitude condition (i.e. one that received three text-messages per day, instead of one) could be introduced and the effectiveness of each condition compared. Another approach could guide people through the gratitude experience by asking them about what they are thankful for, and then, in a second text-message, asking them to think about the gratitude experience more deeply (e.g. the emotions that they experienced and/or what it means about them as a person).

While strengthening the likelihood of inducing gratitude is important, so too is ensuring that the comparison condition is a true control condition. As exemplified in Table 11, it is apparent that several daily reflective condition text-messages had the potential to induce positive affect, and thus the non-significant group differences may not be so surprising. As identified, several studies have only found significant effect of gratitude interventions on wellbeing when compared to a hassles condition (Emmons & McCullough, 2003; Froh et al., 2008; Sheldon & Lyubomirsky, 2006), where gratitude participants have gone up in positive outcome measures, while hassle control group condition participants have decreased.

Gratitude studies have used a range of control conditions, including describing one's living room layout, listing daily hassles, and listing everyday events (Emmons & McCullough, 2003; Harbaugh & Vasey, 2014; Seligman et al., 2005; Watkins et al., 2003). As the current study required participants to respond to 28 questions over the course of the intervention, it was important that the text-message questions were engaging in both the gratitude and control conditions. In an attempt to achieve this, reflective condition text-message questions were upbeat and reflective (i.e. thinking about the past, present, or future). It appears however that this condition had unanticipated effects on youth's mental health and wellbeing. While this inhibits conclusions being drawn about the effect of gratitude, the positive findings in the reflective condition cannot ethically be argued as limitations.

It is possible that the daily text-message interaction itself may have had an effect on participants' mental health and wellbeing. In Youthline's counselling experience, friendliness, being non-judgemental, and using text-language *initiated* by the client are all important in building rapport with counselling clients (Haxell, 2014). A number of participants across both conditions said that receiving the text-messages each day made them feel like someone cared about them, or that someone was actually interested in what they had to say. The common replies may have strengthened the interaction and conversational feeling, especially if participants recognised that someone was reading over their text-message replies. Other participants said that they enjoyed the study because they do not normally send text-messages, and because they felt like they were helping someone. Several participants also spoke of being curious as to what the next text-message would ask, and eagerly awaiting each of the daily questions. This is thus an important area for future research to see if a true control condition does benefit from the text-message interaction.

Common replies were sent as a confirmation that participants' text-messages had been received. These were manually sent out, and, although time consuming, helped to ensure that

all incoming replies had been read and assessed for risk, and the participants would know that it was received. It is possible that the common replies may have encouraged engagement, with the upbeat replies acting as positive reinforcement for replying. For the researcher, sending the common replies was difficult when participants expressed information in their text-messages that one would naturally respond with empathy to (e.g. when a participant referred to their daughter who had leukaemia). In the follow-up questionnaire, a participant said that although they liked that no-one ‘debunked’ their opinion, they felt it would have been nice to know that someone was listening. Replying more personally was beyond the scope of this research project, and illustrates a potential paradox of technology-based interventions. On the one hand, the anonymity may have helped people answer honestly without thinking about how someone might read it, and may also encourage people to sign up to an intervention. On the other hand however, there is evidence from medical literature to suggest that interpersonal interaction over text-message between a patient and doctor may strengthen patients’ feelings of a good relationship with their doctors (Andreassen, Trondsen, Kummervold, Gammon, & Hjortdahl, 2006). As few technology-based interventions have been long-term, it is not known whether engagement would improve if participants felt that it was anonymous, or as if they were interacting with someone. Notably, there were some participants who did not like the common replies (possibly because they were not personalised), and thus a future study could give participants the option if they want confirmation of the text-message being received, and those that do could just be sent a text saying “Thx 4 ur reply” to ensure that these did not potentially encourage engagement.

This discussion illustrates the need for a true control condition to test if the gratitude intervention has an effect over and above the control condition, and if the simple text-message interaction has an effect. A true control condition could be achieved by asking people to describe their every day events, to answer simple yes or no questions, or to receive text-

messages that they are not asked to reply to. The study could employ three conditions (e.g. a time control condition, an everyday events condition, and a gratitude condition) to test the effectiveness of the intervention, and determine whether any differences are attributable to gratitude practice and/or the text-message interaction.

5.1.2 Moderators

In addition to the significant moderator effect found for depression on wellbeing, it is possible that the study had other moderators, however a lack of power meant that these could not be investigated. First, participants appeared to be of relatively high socio-economic status, and a more diverse sample may have been able to detect whether the intervention was more effective for any one socio-economic group. Participants across conditions were also very high in gratitude at pre-intervention. Several authors suggest that people who are high in trait gratitude may not be able to benefit from gratitude interventions. McCullough, Tsang, and Emmons' (2004) resistance hypothesis posits that people who are predisposed to being grateful may already experience the world in a positive light such that no additional positive experiences could lead to any further benefits. Similarly, Froh, Kashdan, et al. (2009) suggest that people high in positive affect may have achieved an 'emotional ceiling', and are thus not susceptible to large gains in wellbeing. People high in trait gratitude experience gratitude with greater intensity, density, span, and frequency (McCullough et al., 2002). It is possible that the gratitude condition questions asked them about things that they were already grateful for. In contrast, participants who were lower in trait gratitude may have benefited significantly from answering the range of questions. This possibility was tested in supplementary analyses, however no significant effects were found.

Another potential moderator is engagement. Although the reflective condition showed higher engagement in terms of number of replies, the length of these participants' replies were,

on average, half the length of those of gratitude condition participants. It is possible that levels of engagement moderated the effect of the intervention. There was not enough variance in either of the engagement levels (i.e. number of replies, and length of replies) however to determine if there were any group differences after engagement was added as a moderator.

Another potential moderator is gender. It is interesting that few males signed up to the intervention. There is mixed evidence as to whether or not females benefit more from gratitude interventions than do males, or vice versa (Froh, Yurkewicz, et al., 2009; Kashdan et al., 2009). Unfortunately, the small number of males in the study prevented us from examining questions around gender differences.

5.1.3 Methodological considerations

This discussion has highlighted several ways in which the text-messages could be developed to enhance effectiveness, especially in relation to how the gratitude and reflective conditions could be developed to overcome their respective limitations. To measure these changes, a number of changes to the methodology are recommended to ensure that effectiveness is captured.

Firstly, while the GQ-6 measure of gratitude was able to measure individuals' levels of gratitude at pre- and post-intervention, and at follow-up, it was not able to capture whether or not people were now grateful to a wider range of themes after taking part in the intervention. Replies to day 28's open-ended question illustrated that participants were grateful for an array of things, however, and, as presented in section 4.3, subjective evaluations at both post-intervention and at one-month follow-up included that the majority of gratitude condition participants felt they were more grateful, and appreciated the smaller things in life as a result of participating in the intervention. Asking participants at follow-up whether or not they feel

that they are more thankful for things since taking part in this study could strengthen such evidence.

To further strengthen the study's methodology, a larger and more diverse sample is needed to investigate both within and between group differences, and the moderators that may impact the study's effectiveness (e.g. gender, age, low and high positive affect, gratitude, engagement). Literature highlights other potential moderators of gratitude interventions, including spirituality, materialism, envy, and suspiciousness (Watkins, 2014). Other methodological limitations include that while the study assessed a range of mental health and wellbeing variables at pre-and post-intervention, and at follow-up, it missed the opportunity to collect data on these each day (explained further in section 5.2.2). Further, several participants noted that the questionnaires were long and repetitive, limitations of which could have resulted in haphazard responding.

5.2 Aim 2: feasibility of this approach with youth aged 16-21 years

A second aim of this study was to investigate the feasibility of the text-message-based approach with youth aged 16-21 years. This is an important area of focus as both technology- and positive-psychology-based interventions are relatively novel areas for health promotion. Drawing on both its strengths and limitations, the current study has several positive contributions to the literature and highlights areas for future research. The following describes such points in relation to each of the below research questions;

- a) How do youth engage and interact with daily questions sent over text-message that they are asked to respond to?
- b) What are the key considerations of delivering text-message-based interventions for health promotion?

5.2.1 Engagement and interaction

Despite the null findings of this approach with gratitude, the high level of engagement and enjoyment among study participants suggests that the delivery approach where participants are asked to reply to daily questions over text-message could be an effective means of delivering mental health promotion interventions to youth. In both conditions, participants enjoyed the study ($M = 4.32$), and participants were highly engaged. As shown in Table 8, over three-quarters of participants replied to at least 22 of the 28 questions within 24 hours of receiving the text-messages. Further, just over 85 percent of participants completed all three questionnaires. Although the reflective condition showed higher engagement in terms of the number of replies, it is noteworthy that their replies were typically only half the length of those of the gratitude condition participants.

These are very promising findings, especially as it has been cautioned that technology-based interventions may struggle with engagement (Bull & McFarlane, 2011). While few gratitude interventions have assessed attrition rates, those that have illustrate relatively low drop out in gratitude conditions compared to the control conditions (Geraghty et al., 2010a; Wood et al., 2010). As high engagement was seen in both conditions in the current study, the high level of engagement is likely to stem from what participants said they enjoyed, namely the study's daily interaction, routine, and text-message content (further discussed below). Participants also identified the ease of taking part in the intervention, with the text-message approach placing minimal demands on self-regulation in comparison to other gratitude interventions. Participants also had autonomy and control over how much they engaged with the intervention. Further supporting high enjoyment is that participants' reasons for not replying were largely due to technical issues (e.g. lack of mobile phone coverage, flat phone battery) and simply forgetting to reply, as opposed to not enjoying the questions. However, just as gratitude interventions may have low attrition rates as students are completing the

intervention in exchange for course credit (Harbaugh & Vasey, 2014), the current study may have encouraged engagement with its incentive of a prize draw. Further, while the average length of text-messages suggests that participants were engaging with the intervention in depth, this cannot be assumed based on the length of text-messages alone.

The way in which participants viewed the intervention did not appear to have an effect on engagement or enjoyment, however it was interesting that gratitude condition participants were significantly more likely to view their involvement as a diary exercise. That is, close to half of the gratitude condition participants indicated that they felt the exercise was like keeping a private diary compared to just under one-third of reflective condition participants. In contrast, half of the reflective condition participants viewed the exercise as if they were having a conversation with someone, compared to just under a third of gratitude condition participants. In previous gratitude interventions, participants have not normally had to expose what they write down. Thus, the finding that gratitude condition participants were more likely to view the exercise as keeping a private diary was important as it illustrates that participants are still likely to engage with the intervention in depth, and are open and honest even whilst knowing that someone would be looking over their reply. Notably, knowing that someone was looking over the replies may also have assisted engagement, as participants may have felt committed to replying to the person. This is in stark contrast to smartphone apps where the sense that someone may read the information they supply may not be felt as much.

Text-messages

As identified, participants enjoyed the content of the text-messages in both conditions. In the gratitude condition, participants enjoyed it for the opportunity to reflect on what they were thankful for, and, in both conditions, to think about their own lives and to think about things that they may not have otherwise thought about. Participants also liked the common

replies, being able to reply in their own time, and the variety of questions. This emphasises the need for text-messages to be phrased in a way that is interactive, and also for the text-messages to be varied so that they are not too repetitive.

While the overwhelming majority of participants enjoyed the daily text-messages, there were problems with some of the questions. One problem was that some questions assumed that people had had particular experiences, such as going to a restaurant. Thus, future studies need to ensure that questions do not assume that participants have had specific experiences. Another question, “If you were invited to a costume party...” had no theme. Questions thus also need to be detailed so that they are easy to understand for the participant. Some reflective condition participants also felt that the questions were boring and insignificant. At the risk of achieving a true control condition, text-messages could be developed to ask more meaningful questions, such as “Where do you see yourself in five years time?”

Interestingly, several participants indicated during the intervention and in the feedback that they did not like the use of text-language. Participants did not indicate why they did not like it (i.e. whether this was because they did not like text-language, or because it was difficult to understand), however it is possible that the increasing number of smartphones with alphabetic keyboards has reduced the use of text-language. Further, existing text-message-based health promotion interventions have found that participants thought text-language was too informal for an intervention (Lim et al., 2012). While minimal text-language was used, a future study should instead build rapport through the use of words that youth could relate to, yet stay professional at the same time.

Finally, while the study showed a moderator effect for depression on wellbeing, where those high in depression showed increases in wellbeing from pre- to post-intervention, and that remained through to follow-up, it is important to note the importance of how text-

messages are phrased as the study's delivery approach could in fact be aversive among those low in positive affect. Research has found that introspection on happiness among depressed individuals may make them feel worse as it serves as a reminder about how unhappy they are with their lives (Conner & Reid, 2012). Further, the questions may seem silly and insignificant to those experiencing depression, and thus it is possible that they may not have enjoyed and/or engaged fully in the intervention.

5.2.2 Considerations for health promotion

Recruitment and Reach

The study's recruitment strategy was very effective, recruiting an impressive 136 participants nationwide in just three weeks. Recruitment was stopped after three weeks when the required sample size was reached, however, with more resources, the study could have recruited more participants. Key strengths of the recruitment strategy included the use of social media, as this enabled the study to be promoted nationwide to a large number of people. While several Facebook pages were personally approached to advertise the study, it was the 'liking' and 'sharing' of their posts about the study that helped to spread the appeal for participants even further. The use of several community organisations to help recruit participants was another key strength of this study's recruitment strategy. This approach may have helped to reach those who had not seen the study advertised on social media (e.g. those who did not have a computer, or those who had not 'liked' the pages that the study was shared on), and participants may have been more likely to trust the source and delivery of the intervention if they found out about it through a community organisation they trust. Another key strength of the recruitment strategy was creating a website for the study. In addition to offering information for participants, it offered a platform for recruiters to request a

recruitment pack, and allowed the study to be promoted beyond those community organisations that were personally approached.

The remote recruitment and delivery of this intervention enabled it to be delivered to youth throughout New Zealand, suggesting that it is an effective approach to reaching youth. Unlike previous studies, the delivery approach also has the potential to reach participants who are not enrolled with health services and/or an education provider. The current study's broad reach can be attributed to mobile phone ownership being almost universal in youth populations, and, as youth are already familiar with communicating over text-message, there is no need to invest time in training participants. A similar intervention with older participants may encounter challenges, however. Of further advantage to youth is that the two-way interaction may support the earlier identified functional approach to attitude change by building participants' confidence in using the approach and assisting them to seek help from services like Youthline.

Several features of the recruitment materials themselves may have encouraged people to sign up to the study. The bright and clear layout of the recruitment materials may have appealed to the targeted demographic, and the study's brand may have too. The MindfulTXT brand was easy to remember, youth-friendly, and the design was bright and modern. The prize draw that was advertised on all recruitment materials is also likely to have appealed to participants. Due to the remote sign up approach, there was no one that participants could talk to in-person if they had any questions or concerns about the study, and thus it was important that all information about the study was presented as clearly as possible. All recruitment materials included an overview of the study (including example questions, information about confidentiality, and contact details), and may have helped participants to decide whether or not the study was something that they wanted to take part in. When participants went to the second stage of the information and consent form, they were asked to tick boxes

demonstrating that they understood the information that was presented, and to write their email address as a signature of their consent. Ensuring that participants were well-informed is likely to have assisted the high engagement levels seen throughout this intervention, as participants knew what would be expected of them.

Limitations of the recruitment strategy are few, but are important to note for future research and development. First, it is possible that the recruitment approach resulted in a sample selection bias where those who chose to sign up to the study differed to those who did not sign up. The majority of participants appeared to have relatively good mental health and to be of higher socioeconomic status. Further, as identified, studies with adult participants have found that fewer depressive symptoms, greater trait curiosity, favourable attitudes, high perceived self-control and social norm beliefs, and being female were related to a greater likelihood that one will self-initiate a gratitude intervention (Kaczmarek, Kashdan, et al., 2014; Kaczmarek et al., 2013). As earlier identified, research has identified that females have a greater person-activity-fit for positive psychology interventions (including gratitude) than do men (Gayton et al., 2015). It is possible that the recruitment materials and outline of what they study would involve appealed more to females than they did men.

While the remote recruitment approach enabled broader reach, the majority of advertising outside of Christchurch took place over social media and could have also resulted in a sample selection bias. Indeed, the majority of participants heard about the study through Facebook (Table 1), and it is possible that those who ‘liked’ the pages that the study was shared on differed to those who had not. To overcome this, paid Facebook advertising could be used, where the study’s advert would appear on news feeds of 16-21 year olds, regardless of their interests. This still would not reach those who do not have Facebook or regular computer access however, and thus the points discussed stress the need for a recruitment approach that is advertised through several means.

Delivering an intervention over technology also gives rise to potential barriers to both signing up and/or engaging with the intervention. As mobile phone ownership is almost universal, a text-message approach was chosen to ensure the majority of youth could access the intervention. However, the reliance on completing the survey on a computer means that it was out of reach for those without access to a computer. Paper copies of the survey were made available, however this required asking for a participant's address to ensure that they could complete the post-intervention and follow-up questionnaires. This meant that the questionnaires could not be entirely confidential. Finally, as encountered in other studies that recruit remotely (Bull & McFarlane, 2011), other limitations include that there was no way of confirming a participant's age, nor was there any way of confirming that it was the same participant who completed the intervention as the one who signed up to it.

Questionnaires

All questionnaires were completed online, and had the potential to encounter participant error. The current study had few participant errors however, with just one ID and one email address entered incorrectly. This is likely due to ensuring participants were reminded of their ID over both text-message and email before the post- and follow-up questionnaires, and telling people they could text ID request if they forgot their ID. In a future study, the questionnaire could be made compatible for smartphones, to improve participant satisfaction and access. Although pre- and post-intervention and follow-up measures are preferable, the study could instead implement brief questionnaires over text-message to extend the intervention's reach to those who do not have regular access to a computer or the internet. This may also decrease the risk of participant error if participants did not need to know their identification number. The intervention could also include daily ratings over text-message, where participants' replies include scale-rating scores of how grateful and happy they are

feeling. Notably however, as mentioned above, this increased focus on happiness could be detrimental among those with depression (Conner & Reid, 2012).

Risk Management

This study has demonstrated the need for technology-based interventions to have risk management strategies. Interventions that engage participants remotely need to account for the potential vulnerabilities of participants, and to make plans for managing these. The risk management plans of other studies have not been detailed (other than providing links to helplines), and are not likely to have been as comprehensive as few text-message-based studies have offered two-way interaction. Fortunately, this study did not encounter any serious safety concerns for participants, however it was not anticipated that some of the replies would come back negatively. The risk management plan was only actioned in a few instances, and the required deviation from the common replies is likely to have had minimal threats to standardisation. In the cases where the risk management plan was actioned, this was simply to advise the participants of Youthline's services so that they knew of a service to contact should they feel the need to. This approach was important in maintaining the participants' autonomy, especially as the emotional tone of text-messages can be difficult to determine and participants may not have felt they needed help. Participants may also not feel ready to talk to someone about any problems they may have, and experience with the text service through the study itself may offer youth a platform to gaining the confidence to ask for help, supporting the functional approach to attitude change. It is possible that more serious incidents could have occurred, and in such instances participants would have been referred directly to Youthline who would be able to respond to their concerns. One challenge that is difficult to overcome however is if the participant does not engage with the support service (i.e. does not text-message back, or answer phone calls), or, if they do, does not disclose the problem.

Prior to the current intervention, all of the daily questions were considered for their sensitivity and pilot-tested with ten young people aged 16-21 years. However, as described in section 4.2.4, it was evident that some of the questions did result in negative emotions for some participants. There was a surprising number of negative replies to questions that asked about people's strengths and talents (i.e. Question 2 in gratitude condition; questions 9 and 23 in reflective condition). This emphasises the need of ensuring that all questions are phrased positively, but also for a study to have the capacity to intervene and encourage participants to think more positively where necessary. Although the likelihood of negative replies may be higher in this study compared to a study that asked questions related to physical activity levels, for example, it is important to note that some negative replies were not in relation to the questions, but rather participants sharing information about their lives. This stresses the need for all studies to be prepared to manage the vulnerabilities of any participants, even if the questions themselves are not expected to provoke negative replies.

Recruiting at-risk participants may increase the likelihood of risk, and thus it is important to ensure a thorough risk management plan in place to deal with more serious incidents. If recruiting from an agency, this could involve liaising with the community organisation to discuss any concerns and see what support a client has (with client's consent). It could also make sure a recommended support service was accessible through a different text number so that participants could access help autonomously without having to be forwarded on through the study – and so that they could also remain in the study. Other changes to the risk management plan would include including Youthline's number on all common reply text-messages, similar to an advertisement. Finally, an automatic text-application would allow for more resources to be dedicated to recognising and responding to risk – especially if more participants were recruited.

Text application

This study was fortunate to have the use of a text queue in Youthline's text-application. As discussed above (in methodology section 3.4.4), key beneficial features of this text-application to the study were ensuring participants' confidentiality by hiding mobile phone numbers, being delivered free of charge (to both participants and researcher), and, being a web-based application, it was easy to copy and paste text-messages into the text box. While the text-application was fit for both the text-counselling service that Youthline provides and for this pilot-study, it did have some limitations that would have the potential to affect the delivery of the intervention. These limitations arise from the manual process required to send text-messages. Firstly, managing 136 participants each day (i.e. sending and replying to incoming text-messages) was a highly demanding and time-consuming task. As a result, the delivery of the intervention was prone to human error (e.g. sending the wrong text-message to the wrong participant), and also increased the possibility of overlooking any concerning replies from participants. Also, some small threats to standardisation that resulted from the manual process of sending out text-messages each day meant that although participants received their text-messages in the morning, afternoon, or evening, the exact time that each text-message was sent each day could vary by up to three hours. A key goal of health promotion is to deliver interventions to large numbers of people, however the identified consequences would likely increase with a larger sample size. Programmable text-application software would be able to overcome many of these challenges (described in section 5.3).

Regardless of the delivery approach, it is still important to be mindful of the limitations that are prone to any technology-based approach, including technical issues affecting the delivery of mobile-phone-based health promotion interventions (e.g. poor mobile phone coverage or battery life) (Bull & McFarlane, 2011). Any participants who did not have regular mobile phone reception may not have been able to engage with the study on a regular basis

and, although the text-message application indicated that the text-messages had been sent, there is no way of knowing whether or not participants actually received all of the text-messages each day. The remote delivery approach also means that there was no way of knowing whether it was the same participant replying each day, or if someone else was using their mobile phone.

5.3 Future research and development

This discussion has highlighted several areas for future development of the text-message-based gratitude intervention, including those that will strengthen the study's methodology (e.g. text-message content and updates to questionnaire), and participant satisfaction (e.g. text-message content). The current section focuses on the delivery approach itself and how it could be developed, in addition to important exploratory areas for future research and practice in e-health promotion.

Text-message-based approaches would benefit from having a programmable text-application that sends out text-messages automatically. This would minimise the risk of human error, improve standardisation, and enable the study to be delivered to larger numbers of people. Participants could also have more control over the way that they received the intervention (e.g. choosing a specific time that they want to receive their text-message question each day, and whether or not they want a common reply). With fewer resources dedicated to simply sending out the text-messages, resources could instead monitor replies to questions and address concerning text-messages where necessary. While there are important considerations when choosing a new text-application (e.g. functionality, confidentiality) and is likely to come at a significant cost, investment in a programmable text-application with these features could be very cost-effective if it requires few staff managing the delivery of the

intervention. It thus demonstrates a promising, low-cost approach for health promotion that is able to reach large numbers of youth.

Technological obsolescence is an important consideration throughout the development, implementation, and ongoing delivery of technology-based interventions. As featureless phones become harder to source, there is potential that text-message may become a less used communication medium. Concerns of unequal access may also be eradicated. A 2013 survey by a global consulting firm predicted that 64% of New Zealanders aged 15-65 years had a smartphone, and ownership would reach 90% by 2018 (Frost and Sullivan, 2013) . Potential advanced features of developing the MindfulTXT approach into a smartphone application include being able to log participant engagement, having built-in questionnaires, use of interactive and appealing graphics, and offer participants more control over how they engage with an intervention. A smartphone application could also explore alternative approaches to delivering the intervention (e.g. developing the approach into a game).

While such discussion illustrates the numerous ways in which the approach could be developed, it is unknown how well people would engage with an application compared to text-message. The sense that one is having a conversation with someone may not exist over an app, and apps may place more demands on self-regulation if engagement requires multiple steps. This is an important area of exploration. Further, text-message is now accessible across a range of devices (e.g. tablets, computers), and is even compatible with the latest technologies (e.g. smart watches). On this basis, it seems premature to develop a smartphone application that may limit reach to those without smartphones or regular computer access. Instead, it is important to monitor how technologies are being used to communicate, and what approaches have the broadest reach to people of varying demographic backgrounds.

Developing the approach to strengthen the delivery of the intervention and improve participant satisfaction would allow exploration into other areas. Important areas for future research into text-message interventions include investigating the approach as a means of delivering other positive psychology interventions (e.g. three good things), and how these can support health promotion theories. Investigation should also explore how effective the interventions are in developing countries where mobile phone use is much higher than internet use. While the nature of technology means that the delivery approach is possible in developing countries, there is a strong need to ensure that the content of the text-messages remain relevant when translated into other languages. Research also needs to explore how interventions can be made more appealing to males, a key challenge that has been documented for both e-health promotion and positive psychology interventions. Finally, any intervention should be pilot-tested with a diverse sample across gender, ethnicity, reading level, and age.

6 Conclusion

This thesis project has illustrated a promising approach to delivering health promotion interventions to youth. Adolescence represents a critical time for reducing the onset and/or impact of mental illnesses, however the poor help-seeking behaviours among youth means that many are not getting the support they need. Further, for those with good mental health, there appear to be few interventions that promote flourishing, as most interventions focus on mental illness. Ensuring reach, and promoting positive mental health at the population level are key goals of health promotion that the current study has the potential to support.

As outlined in section two, literature demonstrates the many benefits of practising gratitude. However, traditional approaches place high demands on self-regulation, and have also used highly selective samples. The text-message-based delivery approach of the current study may have helped minimise demands on self-regulation by using an approach that youth were already familiar with, in addition to having a much broader reach than both traditional gratitude interventions and other, more advanced technology-based interventions. While e-health promotion approaches are expanding rapidly and are taking advantage of advancing technology, many of these are not able to reach people of lower socio-economic status and/or those who are reluctant to use new technology.

While conclusions regarding the gratitude intervention approach of this study cannot be drawn, the main effects suggest that the interaction of asking people to reflect on daily questions over text-message has some effect. This thesis has made several contributions to the literature, many of which are essential for e-health promotion to work towards the goals of the Ottawa Charter. In particular, the recruitment and delivery approach of this intervention enabled the study to be accessed nationwide, and had the potential to reach those who may not have otherwise had access to such an intervention. The high level of enjoyment and

engagement with the approach is also a valuable contribution, not only to support the use of such a delivery approach in health promotion, but also as a means of increasing young people's familiarity with such approaches and supporting them to access help services delivered through similar modes (e.g. Youthline) should they need to. Another key contribution of this study to literature is the need for e-health promotion initiatives to have a comprehensive risk management plan, especially for interventions that encourage two-way interaction.

There are numerous ways in which the approach could be developed to enhance its effectiveness. The text-message-based approach is easily adaptable, and the discussed ideas for future development (e.g. as a gratitude coaching intervention) could be delivered easily. It could also be used to promote other positive health behaviours and positive psychology practices (e.g. three good things). While the text-message approach demonstrates a promising, low-cost approach, it is also important to explore how such content could be delivered through more advanced technology-based approaches, especially if text-messaging was to become obsolete. Nonetheless, at present, this study has demonstrated that the text-message approach is effective in reaching large numbers of youth, and supporting them to flourish in their lives.

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8 Appendixes

Appendix A

Recruitment poster.



Aged between 16 and 21? We need YOU to participate
in the **MINDFUL** study!

What does the study involve?

Each day for 4 weeks, participants will take part in a mindful text-message exchange where they will be asked to reply to a daily text-message asking them anything from "What's your favourite pizza topping", to "What talent/strength do you have that you are thankful for?"

Participation is completely confidential, and free! See MindfulTXT.wordpress.com for more info!

Participate in this study and you'll go in the draw to win some awesome prizes, including \$50 Westfield Gift Vouchers & \$50 Prezzy cards!

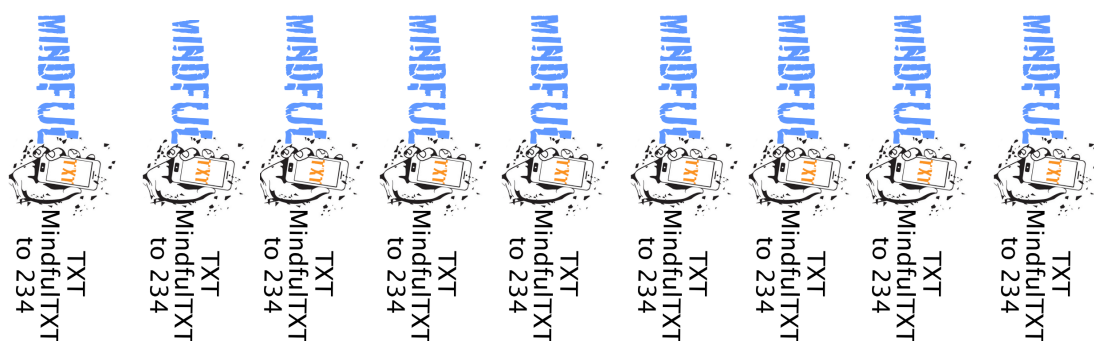
"Awesome! How do I sign up?"

To find out more information, just text 'MindfulTXT' to 234. You'll receive a link to an online information sheet that outlines the finer details of the study. Should you agree to participate in the study, you'll be asked to complete a short questionnaire before you start receiving the text-messages.

Research team and contacts:


This research is being carried out by Emily Arps as a requirement for a Master of Health Science, and is under the supervision of Myron Friesen. You may contact the research team with any questions at emily.arps@pg.canterbury.ac.nz or myron.friesen@canterbury.ac.nz.

The study has been approved by the University of Canterbury's Human Ethics Committee, who may be contacted at human-ethics@canterbury.ac.nz



Appendix B

Recruitment brochure (front and back).



MINDFUL

Aged between 16 and 21? We need you to participate in the MindfulTXT study!

What does the study involve?

Each day for 4 weeks, participants will take part in a mindful text-message exchange where they will be asked to reply to a daily text-message asking them anything from "What's your favourite pizza topping", to "What talent/strength do you have that you are thankful for".

Participation is completely confidential, and free!

Prizes! Participate in this study and you'll go in the draw to win some awesome prizes, including \$50 Westfield Gift Vouchers & \$50 Prezzy cards!

"Awesome! How do I sign up?"

Just text 'MindfulTXT' to 234, or go to MindfulTXT.wordpress.com for more information

Turn over for a brief outline of the process...

The process:

- By texting 'MindfulTXT' to 234, you'll receive a link to a web-based information sheet that outlines more information about the study
- If you are keen to participate in the study, you'll be asked to provide your consent at the end of this information page
- Once you've provided your consent, you'll be directed to a short, online questionnaire
- Once you've done the questionnaire, you'll receive your first text the following day. Texts are sent once a day for 28 days, and you are asked to reply to each one
- After the month of texts, you'll need to complete 2 more questionnaires (one immediately after the mindful text-message exchange, and one 1-month later)

Research team and contacts:

This research is being carried out by Emily Arps as a requirement for a Master of Health Science, and is under the supervision of Myron Friesen. You may contact the research team at emily.arps@pg.canterbury.ac.nz or myron.friesen@canterbury.ac.nz

The study has been approved by the University of Canterbury's Human Ethics Committee, who may be contacted at human-ethics@canterbury.ac.nz



MINDFUL **TXT**
MindfulTXT
to 234

Appendix C

Screenshot of the MindfulTXT study's website.



Appendix D

Information and consent form.



Department: Health Science
Telephone: 03 364-2987 ext8914
Email: emily.arps@pg.canterbury.ac.nz
Study: Investigating the effectiveness of a text-message based well-being intervention among youth
Researchers: This project is being carried out by Emily Arps (Master of Health Science student, University of Canterbury), and is under the supervision of Dr Myron Friesen and Associate Professor Pauline Barnett. The research team can be contacted via email at emily.arps@pg.canterbury.ac.nz or myron.friesen@canterbury.ac.nz.

MindfulTXT Study

You are invited to participate in a study investigating the effectiveness of promoting well-being and mindfulness among youth through text-messages. Participating in this study will involve receiving a text-message each day for a month that has a thought-provoking question that you will be asked to respond to. I, Emily Arps, am leading this study as part of my Masters degree in Health Science and would like to thank you for your interest in participating. Before completing the questionnaire below, please read the following information.

Contact

This project is being carried out by Emily Arps (Master of Health Science student, University of Canterbury), and is under the supervision of Dr Myron Friesen and Associate Professor Pauline Barnett. The research team will be happy to discuss any concerns or questions you may have about your participation in this project, and can be contacted via the following details;

Emily Arps: emily.arps@pg.canterbury.ac.nz 03 364-2987 ext 43229
Myron Friesen: myron.friesen@canterbury.ac.nz 03 364-2987 ext 8914

What does this study involve?

There are four parts to participating in this study: (a) completing a brief initial questionnaire; (b) the mindful text-message exchange for 4-weeks (28 days), where you are asked to reply to a daily text-message; (c) a second questionnaire at the end of the mindful text-message exchange; and finally (d) a short follow-up questionnaire 1-month later. Once you finish the 1-month follow-up questionnaire, your participation in the study will be completed.

Within a day or two of completing the first questionnaire, you will start receiving the questions for the mindful text-message exchange. You will be randomly assigned to one of two groups. Both groups will be sent a text message each day for 4-weeks (28 days). The first group will receive positive reflection questions, such as; “What’s your favourite pizza topping?”, or “What’s your favourite quality about yourself?”. The other group will receive gratitude questions such as, “Think about your past week, what are some of the things that you can be thankful for?”, or “Think about your favourite memories. What/who are you thankful to for making these memories a favourite?” You will be asked to think about each of these questions, and to reply with your answer. When you reply with your answer to the question, you will receive an automatic text-message acknowledging that we’ve received your response. Please note, it may take an hour or two to receive this text acknowledging your reply.

Are there any risks or benefits from being involved?

There are no known physical, mental, or emotional risks posed to you by participating in this study. As a token of our appreciation for your time and participation, everyone who fully participates in this study will be entered into a draw to win some awesome prizes, including \$50 Westfield vouchers and \$50 Prezzy cards. To be eligible for the prize draw, you need to complete the mindful text-message exchange for 28 days and the three questionnaires.

What happens to the information I provide?

All of the data that you provide in this study is completely confidential, including your responses to the questionnaires, and the text-messages that you send back to us. If you agree to participate in this study, we will ask you for your email address. We need this so that we can contact you when it is time to complete the questionnaires at the end of mindful text-message exchange. Your email address will only be accessed when we need to contact you, and will be stored in a separate location to your questionnaire and text-message responses.

Your text-messages are completely confidential and anonymous. Although you are using your cellphone to text us, your cellphone number will not be able to be seen or accessed by the research team to ensure confidentiality and anonymity. You will be assigned a unique participant ID and that number will be used to link the information from your questionnaires and your text-messages.

If your text-messages indicate that your safety or well-being are in jeopardy, we will ask your permission to forward your information to Youthline who will be able to provide you with additional support. Outside of the study hours (i.e. between 10pm and 8am), all text-messages that are sent to us will be sent an automatic reply that include Youthline’s contact details, should you wish to speak to someone. We will review any text-messages that are received between 10pm and 8am the following morning. Please note that although the research team is not able to see your cellphone number, Youthline would be able to track this if there were serious concerns about your safety.

All information gathered in this study will be stored on secured computers systems. The data will not be accessed by anyone outside of the research team, and will be destroyed after 5 years. The results of this study will be published in a Masters’ thesis, as well as other academic publications (e.g., conference presentations, book chapters, and journal articles). However, your individual information will not be disclosed in any of these publications as all results are reported anonymously and at the group level (e.g., averages, percentages, etc.).

Thus, you can be assured of complete confidentiality of data gathered in this investigation.

Who can participate in this study?

To participate, you must be between the ages of 16 and 21 (inclusive). Your participation in this research is entirely voluntary, it is your choice whether to participate or not. You may change your mind later and stop your participation in this study, even if you agreed earlier. If you withdraw, we will remove any information relating to you, so long as this is practically possible. Please note, if you withdraw after the last follow-up questionnaire, all participants' data will have been collated and thus it will be impossible to withdraw individual data.

Reimbursement

We appreciate your time to participate in this study. As a token of our appreciation, participants who complete the intervention and follow-up questionnaires will be entered into a draw to win some awesome prizes, including \$50 Prezzy cards.

Consent

If you agree to participate in the study, you are asked to tick the boxes next to the below statements to confirm that you understand the information.

- ☐ I understand that I will receive a daily text-message for a month long period that I will be asked to reply to. I also understand that I am required to complete three questionnaires, including one pre-intervention, one immediately post-intervention, and one at 1-month post intervention.
- ☐ I understand that participation in this study is voluntary, and I may withdraw from the study at any time. I understand that if I do withdraw from the study, any information I have provided will be withdrawn so long as this is practically possible.
- ☐ I understand that any information I provide will be kept confidential to the researcher and her supervisors, and that any published or reported results will not identify the participants. I understand that a thesis is a public document and it will be available through the UC Library, and may also be published in academic publications (conference presentation, research article, book chapter).
- ☐ I understand that all information gathered in this study will be stored in locked and secure facilities and/or in locked computer files and documents, and will not be accessed by anyone outside of the research team. All data will be destroyed after 5 years.
- ☐ I understand that if the researcher(s) think that my text-messages indicate that I may be at risk, they will send me additional, support-based text-messages. I understand that, upon my consent, any texts that I send may be disclosed to Youthline so that they are able to provide me with additional support if the researcher(s) think that this is required.
- ☐ I understand that I am able to receive a report on the findings of the study by contacting the researcher at the conclusion of the project.
- ☐ I understand that I can contact the researcher Emily Arps (emily.arps@pg.canterbury.ac.nz) or her supervisor, Myron Friesen (myron.friesen@canterbury.ac.nz) for further information and to ask any questions about the project.
- ☐ I understand that if I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-

ethics@canterbury.ac.nz)

By entering your client ID number and email address in the space below, it will be understood that you have consented to participate in this project. Please text 'ID request' to 234 if you have forgotten or lost your client ID number.

Appendix E

Gratitude GQ-6 measure (McCullough et al., 2002).

N.B., following recommendations from Froh, Fan, et al. (2011), item six (“Long amounts of time can go by before I feel grateful to something or someone”) was excluded in the study’s questionnaires due to its low factor loading and apparent abstractness making it difficult to understand for youth. Further, the word ‘grateful’ was replaced with the word ‘thankful’.

Please read each of the following statements carefully. Using the scale provided, please indicate how much you agree with each of the statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
"I have so much in life to be thankful for"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"If I had to list everything that I felt thankful for, it would be a very long list"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"When I look at the world, I don't see much to be thankful for"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I am thankful to a wide variety of people"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"As I get older I feel that I am better able to appreciate the people, events, and situations that have been a part of my life history"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix F

Satisfaction With Life Scale (Diener et al., 1985).

Please read each of the following statements carefully. Using the scale provided, please indicate how much you agree with each of the statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
"In most ways my life is close to my ideal"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"The conditions of my life are excellent"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I am satisfied with my life"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"So far I have gotten the importance things I want in life"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"If I could live my life over, I would change almost nothing"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix G

WHO-5 Well-being measure (WHO, 1998).

Please read each of the following statements carefully. Using the scale provided, please indicate how you have been feeling over the last two weeks for each of the five statements.

Over the last two weeks...

	At no time	Some of the time	Less than half of the time	More than half of the time	Most of the time	All of the time
I have felt cheerful and in good spirits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have felt calm and relaxed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have felt active and vigorous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I woke up feeling fresh and rested	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My daily life has been filled with things that interest me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix H

Rosenberg Self Esteem Scale (Rosenberg, 1965).

Please read each of the following statements carefully. Using the scale provided, please indicate how much you agree with each of the statements.

	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
"In most ways my life is close to my ideal"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"The conditions of my life are excellent"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I am satisfied with my life"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"So far I have gotten the importance things I want in life"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"If I could live my life over, I would change almost nothing"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
"All in all, I am inclined to think that I am a failure"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"At times, I think I am no good at all"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I am able to do things as well as most other people"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I certainly feel useless at times"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I feel I do not have much to be proud of"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree
"I feel that I have a good number of qualities"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I feel that I'm a person of worth, at least on an equal plane with others"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I take a positive attitude towards myself"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"I wish I could have more respect for myself"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"On the whole, I am satisfied with myself"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix I

Depression measure (Kroenke, Spitzer & Williams, 2001).

Please read each of the following statements carefully. Using the scale provided, please indicate how often you have been bothered by each of these problems over the last two weeks.

Over the last two weeks, I have been bothered by...

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling down, depressed or hopeless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble falling or staying asleep, or sleeping too much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling tired or having little energy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poor appetite or overeating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling bad about yourself-or that you are a failure or have let yourself or your family down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble concentrating on things, such as reading the newspaper or watching television	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thoughts that you would be better off dead, or off hurting yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix J

Anxiety scale measure (Spitzer et al., 2006).

Please read each of the following statements carefully. Using the scale provided, please indicate how often you have been bothered by each of these problems over the last two weeks.

Over the last two weeks, I have been bothered by...

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious, or on edge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not being able to sleep or control worrying	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Worrying too much about different things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trouble relaxing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being so restless that it is hard to sit still	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Becoming easily annoyed or irritable	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling afraid, as if something awful might happen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix K

Mindfulness measure (Brown & Ryan, 2003).

Below is a collection of statements about your everyday experience. Using the scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

Currently...

	At no time	Some of the time	Less than half of the time	More than half of the time	Most of the time	All of the time
1. I could be experiencing some emotion and not be conscious of it until some time later.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I break or spill things because of carelessness, not paying attention, or thinking of something else.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I find it difficult to stay focused on what's happening in the present.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I forget a person's name almost as soon as I've been told it for the first time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. It seems I am "running on automatic" without much awareness of what I'm doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I rush through activities without being really attentive to them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I get so focused on the goal I want to achieve that I lose touch with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
what I am doing right now to get there.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I do jobs or tasks automatically, without being aware of what I'm doing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I find myself listening to someone with one ear, doing something else at the same time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continued over page

Appendix K (continued)

	At no time	Some of the time	Less than half of the time	More than half of the time	Most of the time	All of the time
12. I drive places on "automatic pilot" and then wonder why I went there.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I find myself preoccupied with the future or the past.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I find myself doing things without paying attention.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I snack without being aware that I'm eating.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>